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12 PASS

# WAR MACHINE

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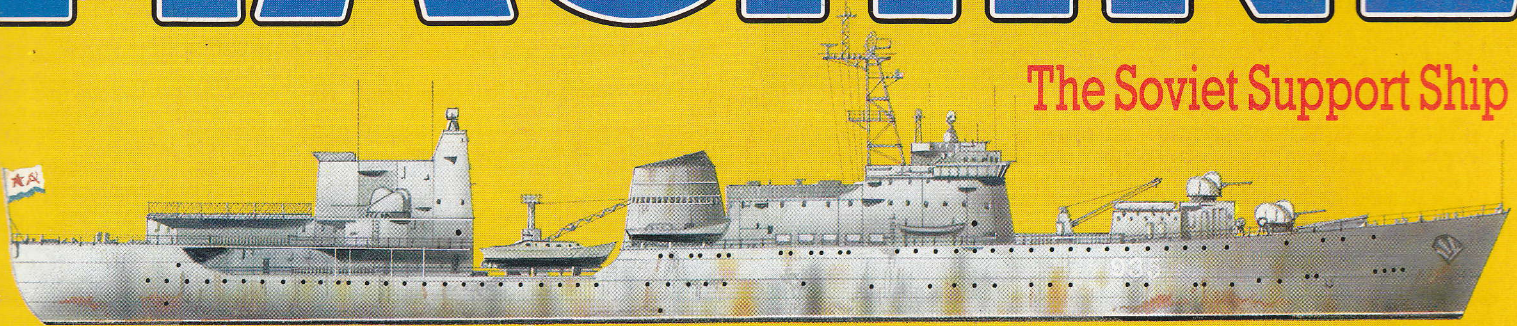
The Soviet Support Ship



Armed Forces of the World: US Air Force (Part 9)

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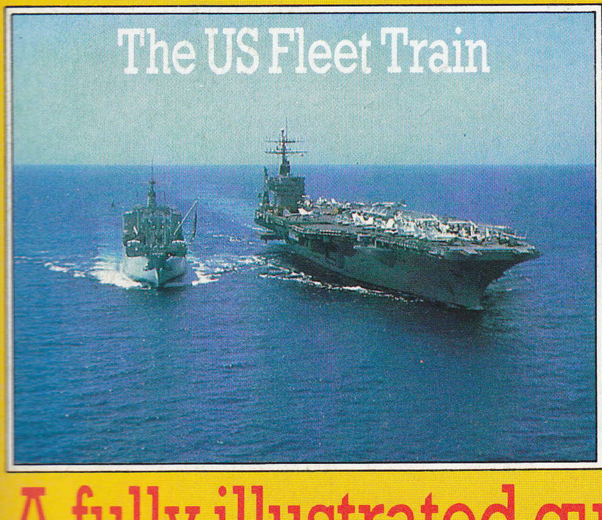

Fleet Support in the Falklands War

A fully illustrated guide to Modern Support Vessels

# WAR MACHINE

**Volume 5** **Issue 54**

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### Armed Forces of the World

US Air Force (Part 9) iii

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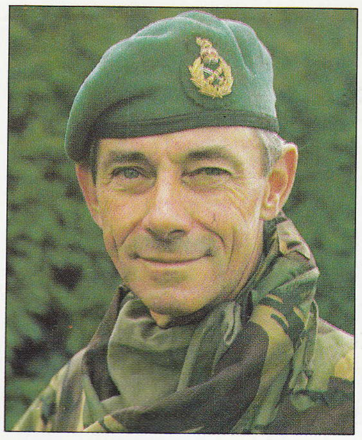

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**WAR MACHINE**

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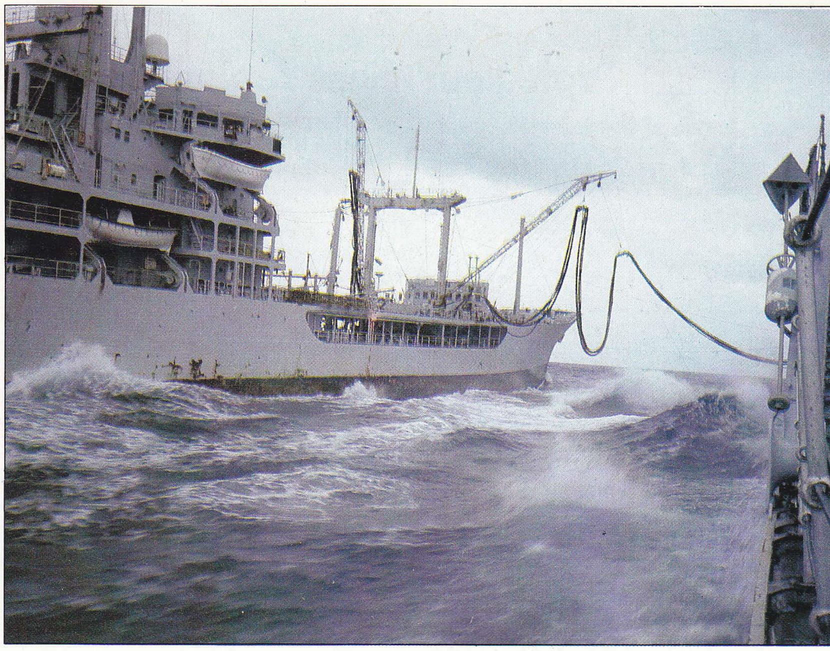
# Modern Support Vessels

***Resupply at sea is not a new concept, and many naval operations of World War II could not have taken place without it. Today, with the US Navy operating worldwide and as a result of conflict in the South Atlantic, the support ship is as important as ever.***



*The RFA* Blue Rover *(A 270) takes part in a replenishment-at-sea (RAS) during the Falklands operation. The* Blue Rover *was the only one of her class to serve in the Total Exclusion Zone, and apart from RAS duties she supplied fuel and ammunition to the army from San Carlos Water between 1 June and 22 June.*

Modern auxiliary ships are usually divided into two broad categories: the underway replenishment (UNREP) ship designed to carry out the direct support of surface combat forces in the forward area of operations, and the fleet support ship which as its primary function provides maintenance and related services to naval forces at advanced bases and home ports with limited resources. To supplement these types in wartime, there would be a wide variety of merchant ships requisitioned to undertake specific tasks in direct support of fleet operations. A classic example of this last facet is the 1982 Falklands War when without the help of 50 merchant ships the Royal Navy could not have supported a task force, let alone have undertaken an amphibious assault of the magnitude required to recapture a number of islands 12875 km (8,000 miles) from its home ports. It should be noted, however, that most of the major sea powers in the world today can call on reserves of commercial shipping for such tasks, the Soviet Navy having the unquestioning obedience of the immense Soviet merchant fleet, wherever it is found on the seas. However, since the Falklands war both the Royal Fleet Auxiliary and the British merchant marine have suffered cutbacks for economy reasons, and it is a moot point whether a task force support train of similar ilk could be formed again.

The US Navy in the meantime is gradually strengthening its support and UNREP force to be able to supply the 600-ship level projected in current construction plans. To meet the unique requirements of the carrier battle groups the US Navy has designed several specialist classes of UNREP ships that combine the capabilities of several older designs in one hull. Such ships form the basis of UNREP groups with their own escort ships and will be the linchpin of any future war at sea, for without constant resupply the warships will not fight effectively.

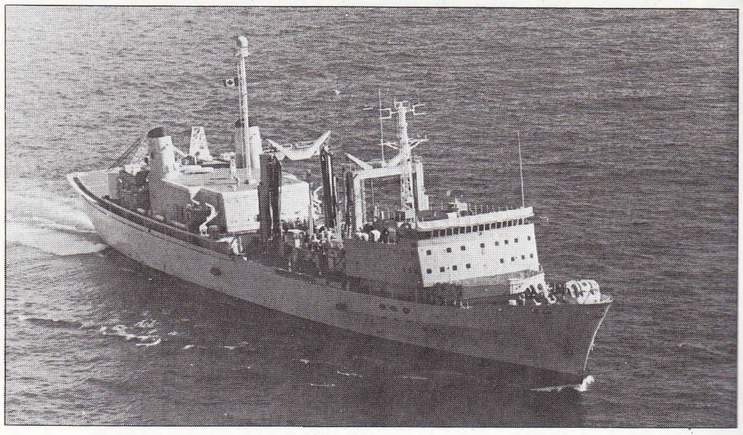
By contrast the expansion of Soviet Naval power has not been matched by a corresponding increase in UNREP capability. Although support, salvage and engineering vessels are in service in some numbers, only the Berezina approaches US replenishment standards.

**Supplying the US carrier battle groups is a formidable task requiring a large number of replenishment ships. The US Navy plans to be able to supply up to five task forces simultaneously, deployed from the Pacific to the Mediterranean.**

CANADA

# 'Protecteur' class replenishment fleet oiler

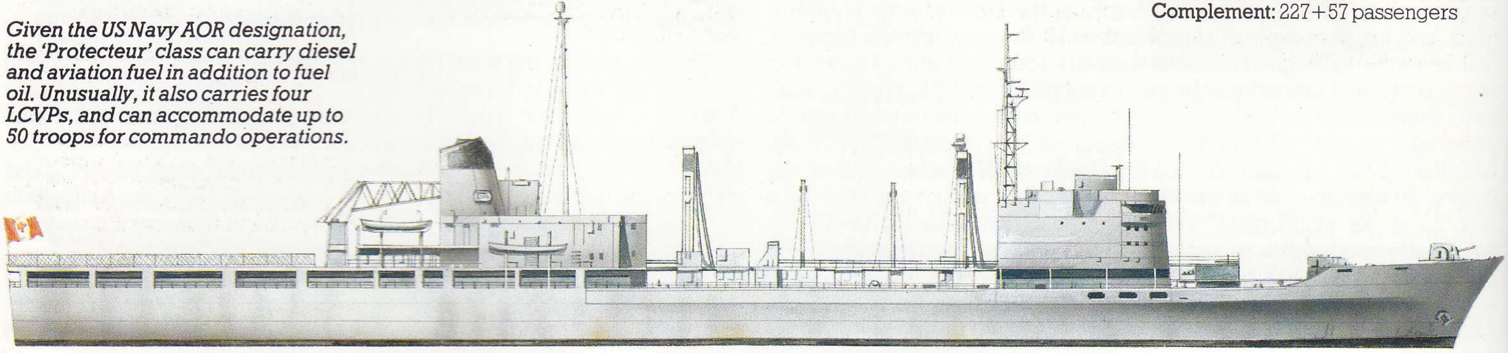
In design the **'Protecteur' class** is an improvement on that of the prototype HMCS *Provider* (AOR 508). The two ships have been given the US AOR (replenishment fleet oiler) designation, and have four replenishment-at-sea stations, one elevator aft of the navigation bridge, two 15-ton capacity cranes on the aft deck, and a large helicopter hangar and flight deck at the stern. The cargo capacity is 13,100 tons of fuel oil, 600 tons of diesel, 400 tons of aviation fuel, 1,250 tons of munitions and 1,048 tons of dry cargo/spares and refrigerated provisions. The aircraft hangar/flight deck area can be used either for spare task group ASW helicopters or for military vehicles and bulk equipment for sealift operations. If required HMCS ***Protecteur*** (AOR 509) and HMCS ***Preserver*** (AOR 510) can also serve as limited-capacity amphibious assault transports with room for 50 or more troops serving in the commando role. Four LCVPs are carried as part of each ship's boat complement. The sole armament is a twin 76-mm (3-in) Mk 33 DP gun mount located at the bow in the eyes of the ship. This positioning has proved to be precarious, mountings having been washed away on several occasions. The *Preserver* completed a mid-life refit in 1982, whilst her sister ship is due to undergo such a refit in the near future. Both ships were laid down in October 1967, and commissioned in August 1969 and July 1970 respectively.



***The Canadian Navy replenishment ship HMCS* Preserver *(AOR 510) is equipped to carry up to three licence-built Sikorsky SH-3 Sea King ASW helicopters. These can be used as spare aircraft by an ASW hunter-killer task group as well as being able to provide vertical replenishment of ammunition, dry stores and fuel to the ships of the group.***

## Specification

**'Protecteur' class**
**Type:** replenishment fleet oiler
**Displacement:** 8,380 tons light and 24,700 tons full load
**Dimensions:** length 171.9 m (564 ft); beam 23.2 m (76 ft); draught 9.1 m (30 ft)
**Propulsion:** 1-shaft geared steam turbine delivering 21,000 shp (15660 kW)
**Speed:** 21 kts
**Armament:** one twin 76-mm (3-in) DP gun
**Aircraft:** three Sikorsky CH-124 Sea King helicopters
**Electronics:** one Decca TM969 navigation radar, one Sperry Mk 2 navigation radar, one URN-20 Tacan, one SQS-505 hull sonar
**Complement:** 227+57 passengers



***Given the US Navy AOR designation, the 'Protecteur' class can carry diesel and aviation fuel in addition to fuel oil. Unusually, it also carries four LCVPs, and can accommodate up to 50 troops for commando operations.***

FRANCE

# 'Durance' class underway replenishment tanker

Currently in production for several navies the **'Durance' class** is named as a *Pétrolier Ravitailleur d'Escadre* (PRE) by the French Navy. There are two port and two starboard solid/liquid cargo underway replenishment positions, one on each beam having a heavy transfer capability. A stern refuelling position is also provided so that up to three ships may be simultaneously refuelled. Vertical replenishment (VERTREP) operations are carried out by the embarked light helicopter. The ***Meuse*** (A 607) was commissioned in 1980 and can carry 5,090 tons of fuel oil, 4,020 tons of diesel, 1,140 tons of TR5 aviation fuel, 250 tons of fresh water, 120 tons of munitions, 180 tons of victuals and 45 tons of fleet spares whilst the other three units, the ***Var*** (A 608, commissioned in 1982), ***Durance*** (A 629, commissioned in 1976) and an unnamed vessel (to be commissioned in 1986) can each carry 7,500 tons of fuel oil, 1,500 tons of diesel, 500 tons of TR5, 130 tons of fresh water, 150 tons of munitions, 170 tons of victuals and 50 tons of fleet spares. Both the *Var* and the unnamed fourth unit will be able to operate as flagships capable of carrying a Maritime Zone staff and a commando troop of up to 45 men; for this the forward superstructure has been extended aft by 8 m (26.25 ft) and the two beam-mounted cranes abaft the bridge replaced by a single centreline crane. Two modified units, HMAS ***Success*** (AOR 01) and an unnamed ship (AOR 02) are on order for the Royal Australian Navy (the former to be commissioned in 1987), whilst two further ships, the ***Boraida*** and ***Yunbou*** have been built for the Saudi Arabian navy, and commissioned in 1984. Both sub-classes have different cargo capacities to the French ships.

## Specification

**'Durance' class**
**Type:** underway replenishment tanker
**Displacement:** 7,600 tons light and 17,800 tons full load
**Dimensions:** length 157.3 m (516.1 ft); beam 21.2 m (69.5 ft); draught 10.3 m (33.8 ft)
**Propulsion:** 2-shaft diesels delivering 20,000 shp (14,914 kW)
**Speed:** 19 kts
**Armament:** two 40-mm AA guns, except *Meuse* one 40-mm AA and two 20-mm AA guns
**Aircraft:** one Aérospatiale Alouette III helicopter
**Electronics:** one navigation radar, one SATCOMM communications system
**Complement:** 150 except *Var* and unnamed vessel 250

***Launch picture of* Durance*, taken in 1975. Commissioned in 1976,* Durance *was the first of a class of four for the French navy. Two have been built for Saudi Arabia, and two are under construction for the Royal Australian Navy.***

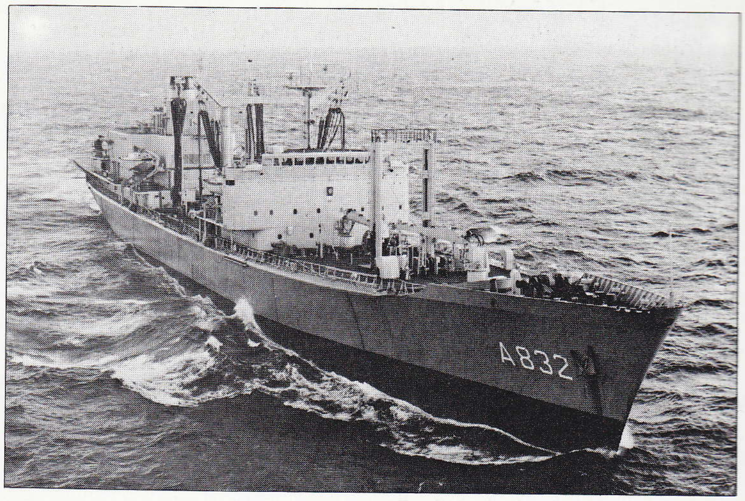
THE NETHERLANDS

# 'Poolster' class fast combat support ship

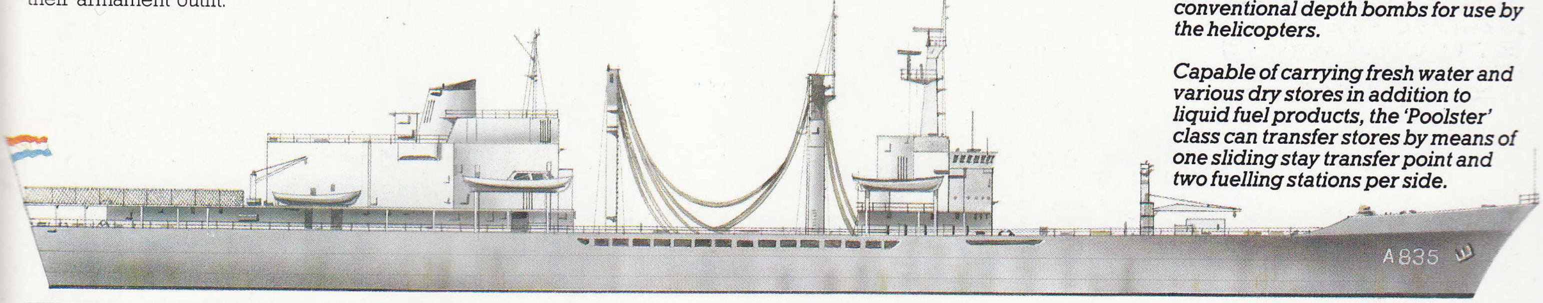
Essentially a fast combat support ship design, the ***Poolster*** (A835) is also capable of taking part in anti-submarine warfare operations with a hunter-killer group by operating and supporting up to five ASW helicopters with weapons and other supplies. She was commissioned in 1964, and her cargo capacity is 10,300 tons, of which 8,000 tons is devoted to liquid fuel products with the rest comprising fresh water, munitions, fleet spares and other stores. If required, she can also carry 300 marines for short distances as an assault transport. In the early 1970s an **'Improved Poolster' class** unit was built as the ***Zuiderkruis*** (A832) and commissioned in 1975. Like her predecessor she has two fuelling stations per side amidships and one constant tension sliding-stay solid cargo transfer point per side forward. Her cargo capacity is 9,000 tons of liquid fuel products, 400 tons of TR5 aviation fuel, 200 tons of fresh water, plus munitions, spare parts and other stores. Two more vessels of this modified design are planned for the late 1980s, one to replace the *Poolster* and the other to support the Dutch navy's third ASW group. Unusually for vessels of this type, the ships carry depth charges as part of their armament outfit.

### Specification
**'Poolster' class**
**Type:** fast combat support ship
**Displacement:** 16,836 tons full load
**Dimensions:** length 169.6 m (556.4 ft); beam 20.3 m (66.6 ft); draught 8.2 m (26.9 ft)
**Propulsion:** 1-shaft geared steam turbines delivering 22,000 shp (16405 kW)
**Speed:** 21 kts
**Armament:** two single 40-mm AA guns, and two depth-charge racks
**Aircraft:** between one and five Westland SH-14 Lynx helicopters
**Electronics:** one ZW-04 air-search radar, one Kelvin Hughes 14/9 navigation radar, one passive ECM suite, two Corvus chaff launchers, one CWE-610 hull sonar
**Complement:** 185

### Specification
**'Improved Poolster' class**
**Type:** fast combat support ship
**Displacement:** 17,357 tons full load
**Dimensions:** length 171.1 m (561.4 ft); beam 20.3 m (66.6 ft); draught 8.2 m (26.9 ft)
**Propulsion:** 1-shaft diesels delivering 21,000 shp (15660 kW)
**Speed:** 21 kts
**Armament:** two single 20-mm AA guns, and two depth-charge racks
**Aircraft:** between one and five Westland SH-14 Lynx helicopters
**Electronics:** two Decca 1226 navigation radars, one passive ECM suite, two Corvus chaff launchers
**Complement:** 185



***HNLMS* Zuiderkruis*, a 'Poolster' class fast combat support ship (A832) is unique in NATO navies in having an ASW armament of depth charges to go with a helicopter group of up to five Westland Lynx ASW helicopters. The stores she carries include lightweight torpedoes and conventional depth bombs for use by the helicopters.***



***Capable of carrying fresh water and various dry stores in addition to liquid fuel products, the 'Poolster' class can transfer stores by means of one sliding stay transfer point and two fuelling stations per side.***

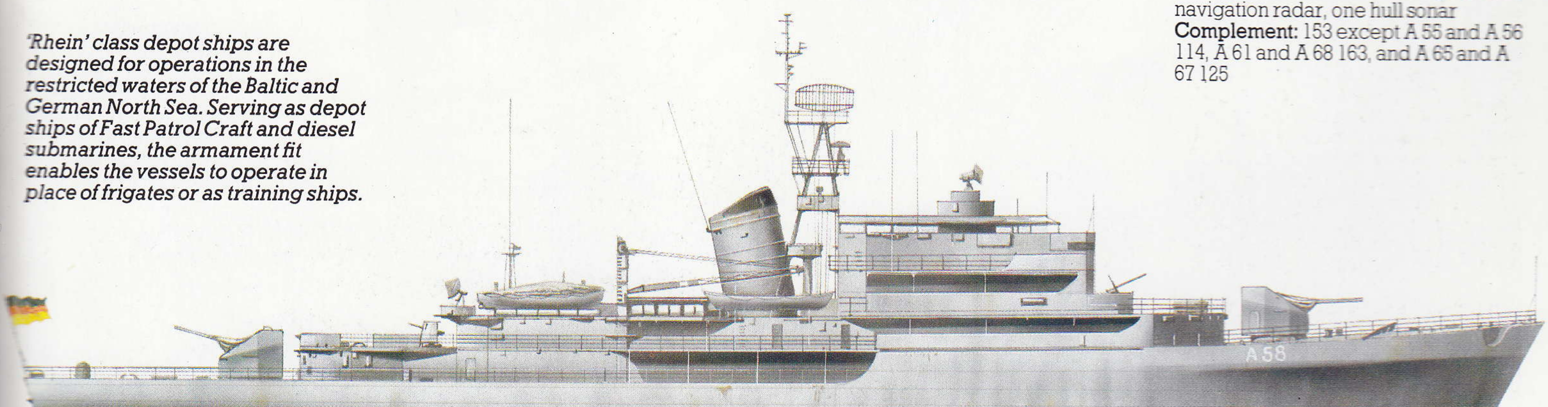
WEST GERMANY

# 'Rhein' class depot ship

Originally totalling 13 vessels, the **'Rhein' class** of depot ships is subdivided into three groups: the **Type 401** for missile and torpedo attack craft, the **Type 402** for mine countermeasures vessels, and the **Type 403** for submarines. Each group differs in overall length, machinery fit and cargo capacity. At present the West German navy only has 10 of the class in service. The Type 401 units are the ***Rhein*** (A 55), ***Elbe*** (A 61), ***Main*** (A 63), ***Neckar*** (A 66), ***Werra*** (A 68) and ***Donau*** (A 69); the Type 402 ships are the ***Saar*** (A 65) and ***Mosel*** (A 67); and the Type 403 units are the ***Lahn*** (A 58) and ***Lech*** (A 56). The ships were all commissioned in the first half of the 1960s. Two others, the ***Cezayirli Gaza Hasan Paşa*** (ex-Type 401 *Ruhr*) and the ***Sokulla Mehmet Paşa*** (ex-Type 402 *Iser*) were given to Turkey, whilst the third unit, the ***Aegeon*** (ex-Type 401 *Weser*) was transferred to Greece. The two Type 403 submarine tenders *Lech* and *Lahn* do not carry the two characteristic single 100-mm (3.9-in) guns of the rest of the class, which allow those units to operate in place of frigates, but instead have 200 tons of stores and spares, 200 tons of fuel and 40 spare torpedoes for their submarines. The *Neckar, Werra* and *Donau* can also function as training vessels if required. All 13 ships were equipped with mine rails to serve as minelayers in wartime. The Type 401 is distinguishable from the Type 402 by having a single crane to port, whilst the latter units have two cranes side-by-side farther aft. Two of the Type 401 tenders are to undergo refits to support the new type 143A missile craft.

### Specification
**'Rhein' class**
**Type:** depot ship
**Displacement:** Type 401 2,370 tons standard and 3,000 tons full load: Type 402 2,330 tons standard and 2,940 tons full load: and Type 403 2,400 tons standard and 2,956 tons full load
**Dimensions:** length 98.2 m (322.2 ft) for Type 401, 98.5 m (323.2 ft) for Type 402 and 98.6 m (323.5 ft) for Type 403; beam 11.83 m (38.8 ft); draught 5.2 m (17.1 ft)
**Propulsion:** 2-shaft diesels delivering 14,400 hp (10738 kW)
**Speed:** 20.5 kts
**Armament:** two single 100-mm (3.9-in) DP (except A 55 and A 56) and four single 40-mm AA (except two twin 40-mm AA in A 55 and A 56), plus provision for up to 70 mines according to type
**Electronics:** one DA-02 air- and surface-search radar, two WM-45 fire-control radars, one Kelvin Hughes 14/9 navigation radar, one hull sonar
**Complement:** 153 except A 55 and A 56 114, A 61 and A 68 163, and A 65 and A 67 125

***'Rhein' class depot ships are designed for operations in the restricted waters of the Baltic and German North Sea. Serving as depot ships of Fast Patrol Craft and diesel submarines, the armament fit enables the vessels to operate in place of frigates or as training ships.***



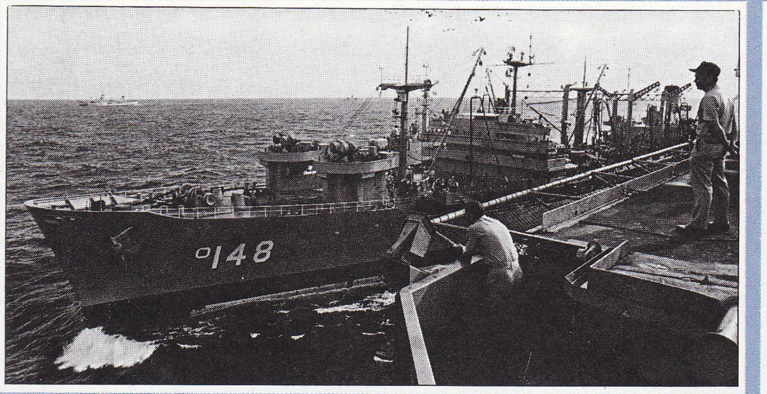
# The US Fleet Train

***Born out of a need to fight the Pacific War across vast distances, far from convenient repair and support facilities, the US Navy fleet train has evolved into a formidable instrument. It is capable of maintaining carrier battle groups world-wide, making a realistic projection of American power completely feasible.***

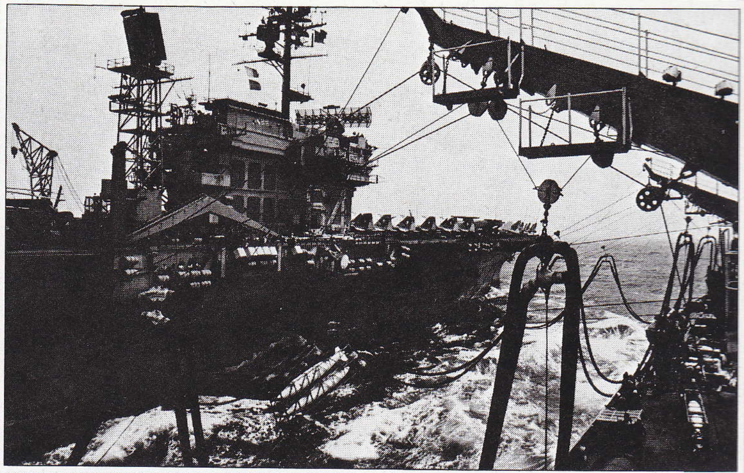
Over the years the US Navy has developed its underway replenishment capability to the point where no other navy comes even close to matching its resources or excellence. This was carried out to meet the requirement for oil, munitions and combat stores replenishment during the US Navy's regular distant-water deployments far from the shores of the USA, and to carry these cargoes a number of specialist ship classes were evolved. These include the AE (ammunition ship), AF (store ship), AFS (combat store ship), AO (oiler), AOE (fast combat support ship) and AOR (replenishment oiler) types, with the emphasis in latter years on designs such as the AOE and AOR which combine the capabilities of several different replenishment ship types on one hull, with helicopter VERTREP (vertical replenishment) capability to undertake direct support of the surface combatants in their operational areas. Planned UNREP force levels provide a wartime capability of supporting deployed carrier, surface action or amphibious warfare task groups in up to four or five locations simultaneously. This capacity is based on the availability of certain foreign storage depots and the use of civilian-crewed Military Sealift Command (MSC) ships to carry resupply cargoes from the USA and these overseas bases for transfer to the UNREP units in or near the theatres of operation. During peacetime operations some 16 or 18 UNREP ships are regularly forward-deployed in the Mediterranean, western Pacific and Indian Ocean in support of task force groups stationed there.

To back up the UNREP vessels the US Navy has a considerable number of fleet support ships. These are of the AD (destroyer tender), AGDS (deep submergence support ship), APB (self-propelled barracks ship), AR (repair ship), ARC (cable-repair ship), ARL (small repair ship) and AS (submarine tender) types, and provide maintenance, repairs and related towing and salvage services at advanced US Navy bases and at ports in the USA. The AR, AS and AD tenders normally do not provide fuel, munitions or other supplies to any ships except those alongside during a maintenance or repair period. The AS nuclear submarine tenders regularly supply electrical power to submarines whose reactor plants are shut down, and the SSBN tenders on deployment to Holy Loch in Scotland and US Fleet train at the two bases in the USA (Kings Bay, Georgia and Charleston, South Carolina) carry and maintain spare Trident and Poseidon SLBMs. They also act as floating accommodation ships while the submarines are being overhauled, as do the AD destroyer tenders for their charges. Two of the AD/AS depot ships or AR repair ships are normally forward-deployed in the Mediterranean, with another two positioned in the western Pacific and Indian Oceans. Because of a shortage of enlisted men, an increasing number of UNREP and fleet support ships are being transferred to MSC to be disarmed and crewed by civilians. This allows them to visit any port as a merchant ship and not as a warship, which can be of distinct advantage at times.

Future construction plans include vessels of both the UNREP and fleet support types, with new AOE and AO designs prominent. As a ready gap-filler, the US Navy has taken over the three ex-RFA 'Ness' class stores support ships that could no longer be run by the Royal Navy because of funding problems. These are crewed by the MSC and are used to help with the massive logistic problems suffered by the US Navy when it deploys two carrier battle groups to the Indian Ocean and Persian Gulf areas.



*USS* Ponchatoula *of the 'Neosho' class whilst in US Navy service refuels the fossil-fuelled carrier USS* Kitty Hawk *during operation RIMPAC 75, a joint Canadian, New Zealand, Australian and American exercise in the Pacific. The cargo capacity is 18,000 barrels of liquid fuels and the class can carry a service force commander and his 11 staff.*

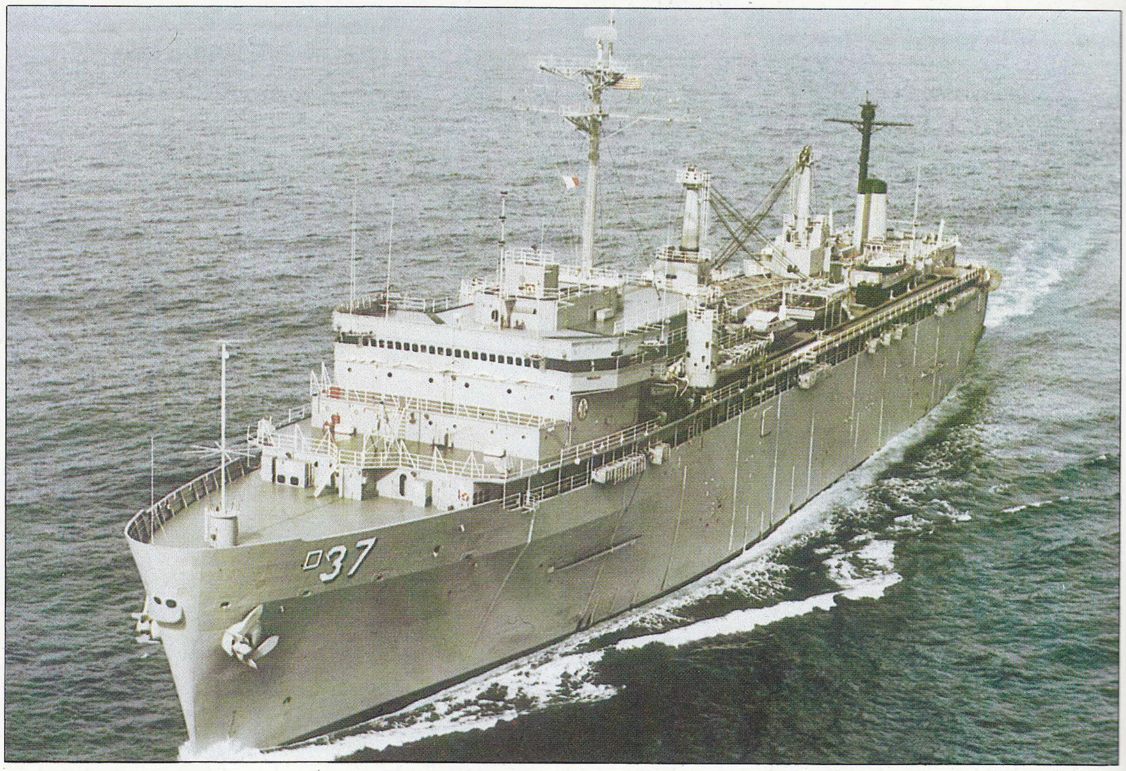


*Largest of the fast combat support ships afloat are the 'Sacramento' class. At over 50,000 tons full load, they provide fast underway replenishment of petroleum products, munitions, provisions and fleet freight to forward-deployed combat ships, as demonstrated here by the USS* Sacramento *(AOE1), transferring weapons to the carrier USS* Constellation *in the Indian Ocean.*

*USS* Kawishiwi, *a 'Neosho' class oiler, is seen refuelling the veteran carrier* Midway *and her escorting cruiser USS* England *during the late 1970s. Since then, the* Kawishiwi *has been disarmed and manned by a civilian crew.*

USA

# ‘Yellowstone’ and ‘Samuel Gompers’ class destroyer tenders



***The first US destroyer tender of post-World War II design was the USS* Samuel Gompers *(AD37). The two vessels of the class were followed by four of the ‘Yellowstone’ design.***

The **‘Samuel Gompers’ class** ships were the US Navy's first destroyer tenders designed after World War II specifically to support surface combatants armed by guided missiles and with nuclear or gas turbine propulsion. The two ships are similar in layout to the ‘L.Y. Spear’ class submarine tenders, and were completed with a landing platform and hangar for ASW DASH drones. In the USS *Samuel Gompers* (AD 37) the hangar has been converted to a boat repair shop. The design was followed by the modified **‘Yellowstone’ class** of four ships, which offer the same facilities and, like the two earlier ships, can simultaneously service up to six ships moored alongside. Each of the ‘Yellowstones’ carries two 30-ton and two 3.5-ton capacity travelling cranes, whereas the units of the earlier class each have only the latter. The newer design also has the additional capability of carrying and overhauling spare LM2500 gas turbine engines for the ‘Ticonderoga’, ‘Spruance’, ‘Kidd’ and ‘Oliver Hazard Perry’ classes of surface combatants. Two further units of the ‘Yellowstone’ class are due to be ordered under current US Navy construction plans in order to meet the growth of the gas turbine-powered fleet.

The *Samuel Gompers* was commissioned in 1968, her sister ship USS ***Puget Sound*** (AD 38) commissioning during the following year. The four ‘Yellowstone’ class ships are the USS ***Yellowstone*** (AD 41), USS ***Acadia*** (AD 42), USS ***Cape Cod*** (AD 43) and USS ***Shenandoah*** (AD 44), commissioned at yearly intervals from 1980 to 1983.

### Specification
**‘Samuel Gompers’ class**
**Type:** destroyer tender
**Displacement:** 13,600 tons light and 22,260 tons full load
**Dimensions:** length 196.5 m (644.7 ft); beam 25.9 m (85 ft); draught 9.1 m (30 ft)
**Propulsion:** 1-shaft geared steam turbines delivering 20,000 shp (14914 kW)
**Speed:** 18 kts
**Armament:** four single 20-mm AA guns
**Aircraft:** provision for a helicopter on a landing pad
**Electronics:** one LN-66 navigation radar, one SPS-10 surface-search radar, one SATCOMM system
**Complement:** 1,206 for AD 37 and 1,314 for AD 38

### Specification
**‘Yellowstone’ class**
**Type:** destroyer tender
**Displacement:** 13,280 tons light and 20,244 tons full load
**Dimensions:** length 192.6 m (631.9 ft); beam 25.5 m (83.6 ft); draught 7.3 m (24 ft)
**Propulsion:** 1-shaft geared steam turbines delivering 20,000 shp (14914 kW)
**Speed:** 20 kts
**Armament:** two single 40-mm AA and two single 20-mm AA guns
**Aircraft:** provision for a helicopter on a landing pad
**Electronics:** one LN-66 navigation radar, one SPS-10 surface-search radar, one SATCOMM system
**Complement:** 1,051

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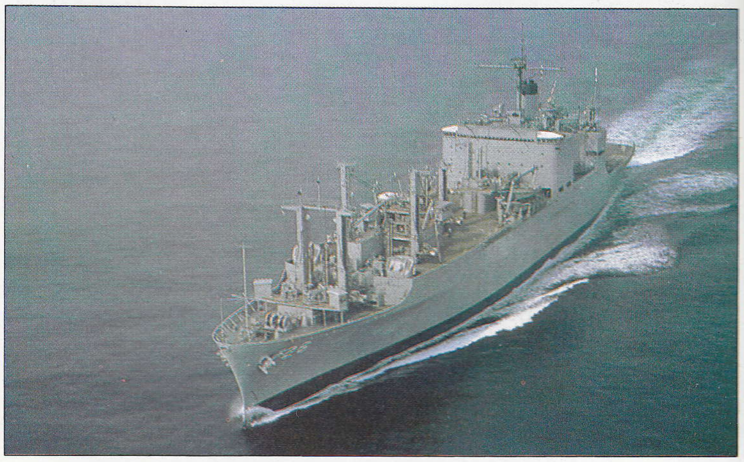
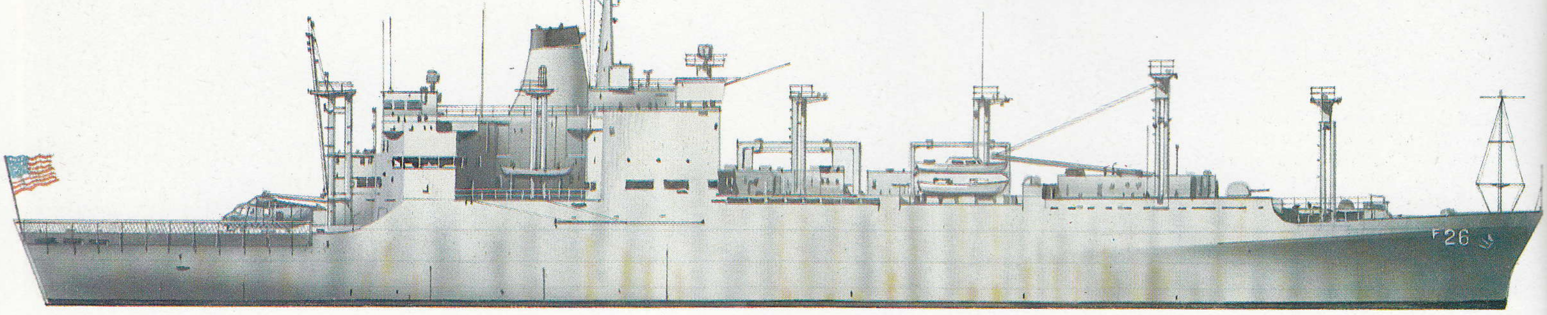
USA

# ‘Kilauea’ class ammunition ship

The **‘Kilauea’ class** of ammunition ship (AE) is easily recognized by its superstructure arrangement forward of the aft helicopter deck. The eight ships, all commissioned between 1968 and 1972, are designed for the rapid underway transfer of missiles and other munitions to the units of a battle group by alongside replenishment or helicopter VERTREP. For the latter they have a hangar 15.24 m (50 ft) long and 4.72-5.33 m (15.5-17.5 ft) wide built into the aft superstructure for the two Boeing Vertol UH-46A/D Sea Knight helicopters embarked. These are the standard US Navy VERTREP helicopters, and can carry either 1361 kg (3,000 lb) of cargo internally or up to 4536 kg (10,000 lb)



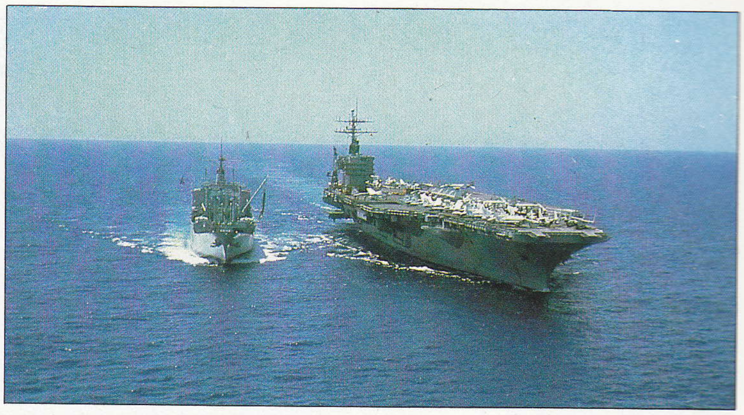
***Right: USS* Kilauea *(AE26) has now been transferred to the civilian-manned Military Sealift Command with the pennant number T-AE26. Another, the USS* Butte *(AE27), is to follow shortly after being disarmed.***



***Below: The ‘Kilauea’ class can carry about 6,500 tons of munitions and has facilities for the transport and servicing of nuclear missile warheads and aircraft bombs carried by carrier battle groups.***

externally in a sling. All the vessels have fin stabilizers, and with the exception of the USNS ***Kilauea*** (T-AE26) have the Mk 36 Super RBOC chaff rocket launcher system fitted. In 1980 the *Kilauea* was transferred to the civilian-manned Military Sealift Command with the USS ***Butte*** (AE27) to follow in Fiscal Year 1984. The total cargo capacity is assessed to be around 6,500 tons of munitions including facilities for the transport and servicing of nuclear weapons such as missile warheads and aircraft bombs for use by a carrier battle group. The other units of the class are the USS ***Santa Barbara*** (AE28), USS ***Mount Hood*** (AE29), USS ***Flint*** (AE32), USS ***Shasta*** (AE33), USS ***Mount Baker*** (AE34) and USS ***Kiska*** (AE35).

**Specification**
**'Kilauea' class**
**Type:** ammunition ship
**Displacement:** 9,369-13,688 tons light and 18,088 tons full load, except AE26 and AE27 17,931 tons full load
**Dimensions:** length 171.9 m (564 ft); beam 24.7 m (81 ft); draught 9.1 m (30 ft)
**Propulsion:** 1-shaft geared steam turbine delivering 22,000 shp (16405 kW)
**Speed:** 21 kts
**Armament:** T-AE26 none, AE27 two twin 76-mm (3-in) AA guns, AE28 and AE29 four twin 76-mm (3-in) AA guns, and AE32 to AE35 two 20-mm Phalanx CIWS mountings
**Aircraft:** two Boeing Vertol UH-46D Sea Knight helicopters
**Electronics:** one SPS-10 surface-search radar, one SATCOMM system, one SLQ-32(V)1 ESM suite, one Mk 36 Super RBOC chaff launcher (except T-AE26)
**Complement:** T-AE26 188, and others between 347 and 353



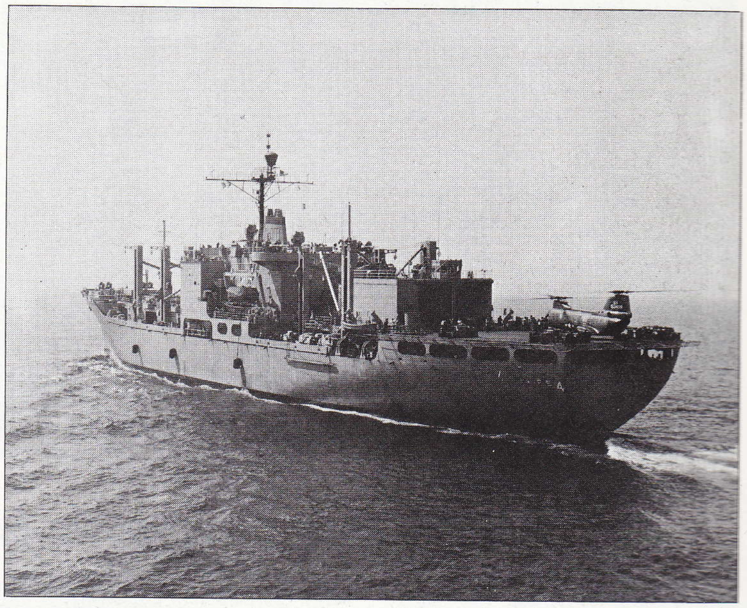
*USS* Mount Baker *(AE34), a 'Kilauea' class ammunition supply ship, is replenishing the aircraft carrier USS* Nimitz *(CVN68) during a training exercise off Guantanamo. She carries a wide range of aviation ordnance stores in her cargo.*

USA

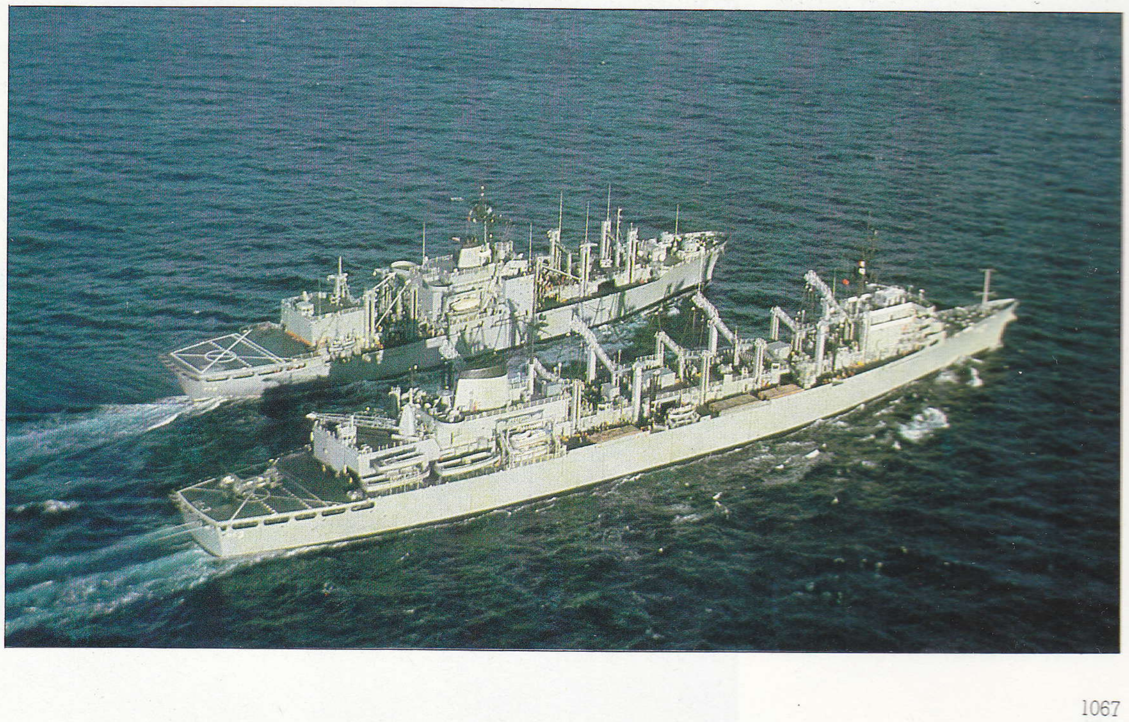
# 'Mars' class combat stores ship

The **'Mars' class** of combat support ship (AFS) are large purpose-built underway replenishment vessels that combine the capabilities of the stores ship (AF), stores issue ship (AKS) and aviation stores ship (AVS) in one hull. They do not carry bulk petroleum products as do the AOE and AOR classes, and are fitted with four M-shaped cargo masts with constant-tension transfer rigs. The cargo capacity is 7,000 tons, of which 1,300 tons are refrigerated goods. The cargo is stored in five holds: two for spares, one for dry provisions, one for refrigerated goods and one for aviation spares. Some 25,000 types of spares are carried, and these are divided between 40,000 bins and racks which are managed by several data-processing machines. Cargo transfer between decks and the helicopter deck is handled by more than 10 5.5-ton capacity hoists, and on-deck replenishment operations are monitored by closed-circuit television. VERTREP helicopter operations are possible from a hangar 14.25-15.5 m (46.75-51 ft) long and 4.88-7.0 m (16-23 ft) wide and located with the flight-deck at the aft end of the superstructure for the two Boeing Vertol UH-46A/D Sea Knight helicopters normally embarked. No more AFS type vessels are due to be procured until the 1990s as the US Navy has bought the three ex-RFA 'Ness' class vessels from the UK to forestall any shortfall in numbers. The units of the class, commissioned between 1963 and 1970, are the USS ***Mars*** (AFS1), USS ***Sylvania*** (AFS2), USS ***Niagara Falls*** (AFS3), USS ***White Plains*** (AFS4), USS ***Concord*** (AFS5), USS ***San Diego*** (AFS6), and USS ***San Jose*** (AFS7).

**Specification**
**'Mars' class**
**Type:** combat stores ship
**Displacement:** 9,200-9,400 tons light and 15,900-18,663 tons full load
**Dimensions:** length 177.1 m (581 ft); beam 24.1 m (79 ft); draught 7.3 m (24 ft)
**Propulsion:** 1-shaft geared steam turbine delivering 22,000 shp (16405 kW)
**Speed:** 20 kts
**Armament:** two twin 76-mm (3-in) AA guns
**Aircraft:** two Boeing Vertol UH-46D Sea Knight helicopters
**Electronics:** one SPS-10 surface-search radar, one SATCOMM system, one SLQ-32(V)1 ESM suite, one Mk 36 Super RBOC chaff launcher
**Complement:** 486



*Right: The 'Mars' class combat support ship USS* White Plains *(AFS4), with a Boeing Vertol UH-46D Sea Knight VERTREP helicopter of Helicopter Combat Support Squadron 3 on the flight deck aft. She is fitted with M frames and automatic tensioning devices to transfer the stores and spare parts that she carries to ships steaming alongside.*

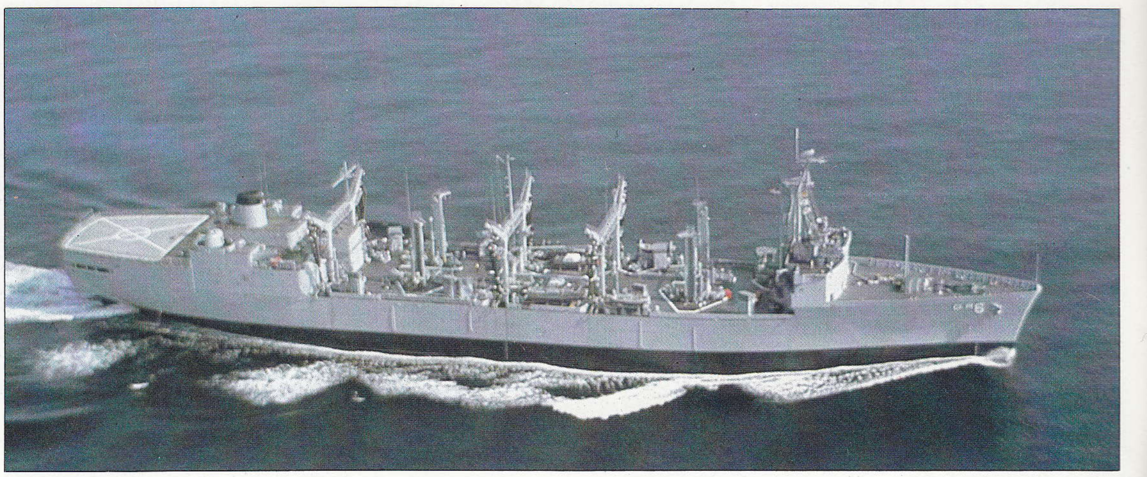


*One of the 'Sacramento' class fast replenishment ships steams in company with a 'Mars' class combat stores ship. An Underway Replenishment Group in wartime would consist of such ships together with several guided missile and ASW frigates that would act as the Group's escorts.*

USA

# 'Wichita' class replenishment fleet oiler

A smaller and less expensive derivative of the 'Sacramento' design, the **'Wichita' class** of replenishment fleet oiler (AOR) provides for the rapid replenishment at sea of surface combatant ships with petroleum, munitions and a limited amount of provisions and fleet freight. All except the USS ***Roanoke*** (AOR7) were completed between 1969 and 1976 without hangars flanking the stack, but these are now being retrofitted to all units to allow the embarkation of two Boeing Vertol UH-46A/D Sea Knight helicopters for VERTREP operations. The cargo capacity is 175,000 barrels of liquid fuels, 600 tons of munitions, 425 tons of dry stores and spares, and 150 tons of refrigerated goods. There are four constant-tension stations for liquid cargo and two for solid cargo transfer to port, with three and two respectively to starboard. Although relatively modern, the class will have to undergo a Service Life Extension Program refit cycle in the late 1980s to ensure the US Navy's replenishment-at-sea capabilities into the next century. The seven units of the class are the USS ***Wichita*** (AOR1), USS ***Milwaukee*** (AOR2), USS ***Kansas City*** (AOR3), USS ***Savannah*** (AOR4), USS ***Wabash*** (AOR5), USS ***Kalamazoo*** (AOR6) and the previously mentioned *Roanoke*.

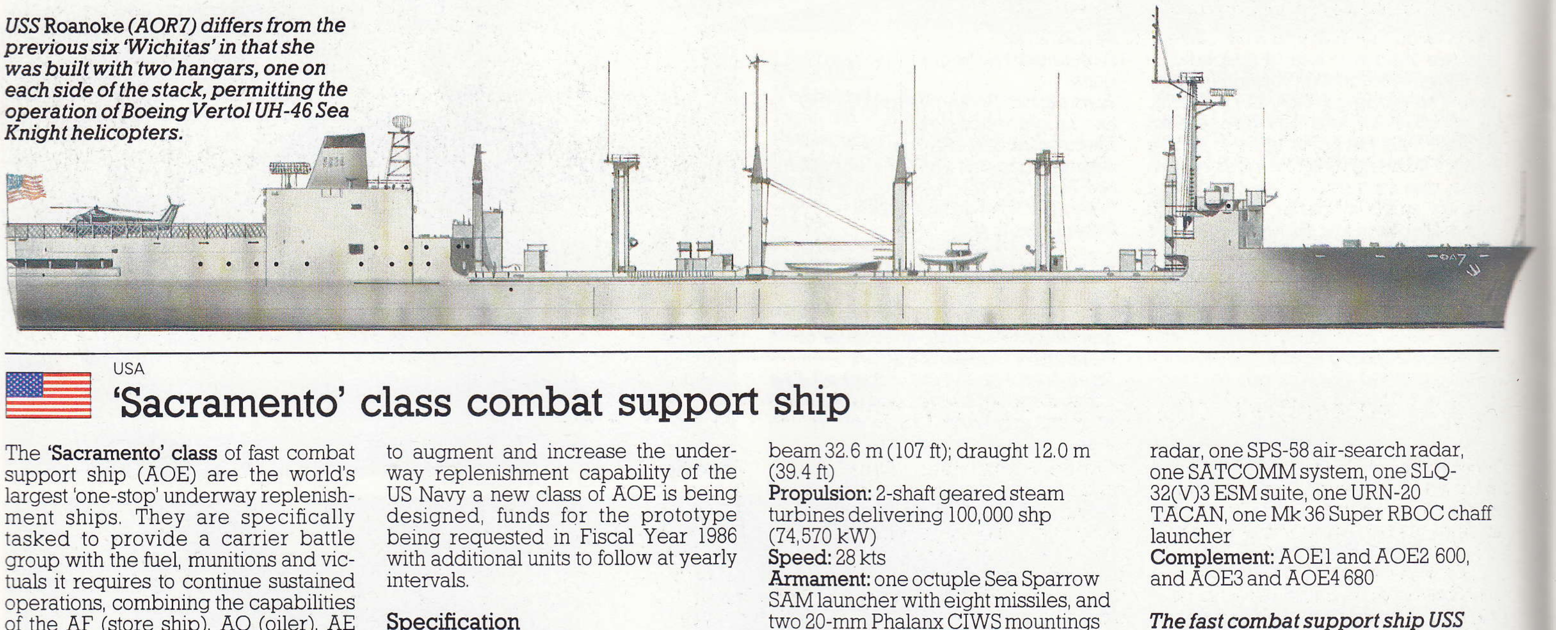


***USS** Kalamazoo **(AOR6) can carry more than 1,000 tons of cargo in addition to 175,000 barrels of oil. She is to be fitted with a hangar on each side of her stack to enable the operation of VERTREP helicopters.***

## Specification

**'Wichita' class**
**Type:** replenishment fleet oiler
**Displacement:** 12,500 tons light except AOR7 13,000 tons light and 38,100 tons full load
**Dimensions:** length 200.9 m (659 ft); beam 29.3 m (96.1 ft); draught 10.2 m (33.5 ft)
**Propulsion:** 2-shaft geared steam turbines delivering 32,000 shp (23862 kW)
**Speed:** 20 kts
**Armament:** one octuple Sea Sparrow SAM launcher with eight missiles, and two 20-mm Phalanx CIWS mountings (both being fitted)
**Aircraft:** provision for two Boeing Vertol UH-46D Sea Knight helicopters being provided
**Electronics:** one SPS-10 surface-search radar, one SPS-58 air-search radar, one SATCOMM system, one SLQ-32(V)3 ESM suite, one Mk 36 Super RBOC chaff launcher
**Complement:** 418-431

***USS** Roanoke **(AOR7) differs from the previous six 'Wichitas' in that she was built with two hangars, one on each side of the stack, permitting the operation of Boeing Vertol UH-46 Sea Knight helicopters.***



USA

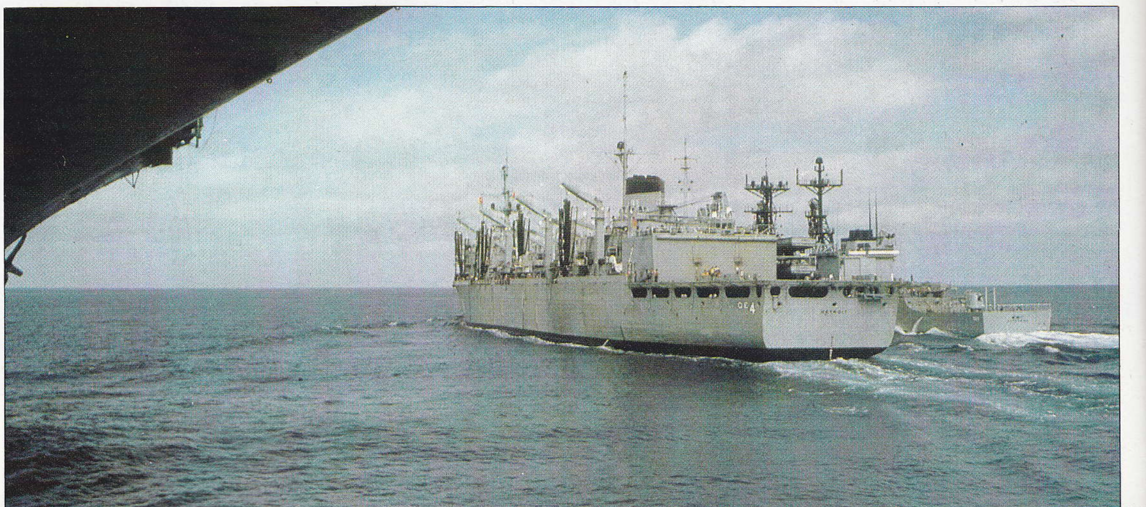
# 'Sacramento' class combat support ship

The **'Sacramento' class** of fast combat support ship (AOE) are the world's largest 'one-stop' underway replenishment ships. They are specifically tasked to provide a carrier battle group with the fuel, munitions and victuals it requires to continue sustained operations, combining the capabilities of the AF (store ship), AO (oiler), AE (ammunition ship) and AK (cargo ship) single-role replenishment ships in one hull design. The cargo capacity is 177,000 barrels of liquid fuels, 2,150 tons of munitions, 250 tons of dry stores, 250 tons of refrigerated stores, and 250 tons of fleet freight and spares. Because of their immense individual cost only four of a planned five ships were built, the smaller and less expensive 'Wichita' class AOR being developed to supplement them. A large helicopter flight deck and hangar are fitted aft for the two or three Boeing Vertol UH-46A/D Sea Knight VERTREP helicopters embarked. All four units are to undergo Service Life Extension Program refits (each lasting 18 months) from Fiscal Year 1984 onwards. The four units (commissioned in 1964, 1967, 1969 and 1970 respectively) are the USS ***Sacramento*** (AOE1), USS ***Camden*** (AOE2), USS ***Seattle*** (AOE3) and USS ***Detroit*** (AOE4). In a further move to augment and increase the underway replenishment capability of the US Navy a new class of AOE is being designed, funds for the prototype being requested in Fiscal Year 1986 with additional units to follow at yearly intervals.

## Specification

**'Sacramento' class**
**Type:** fast combat support ship
**Displacement:** 19,200 tons light and 53,600 tons full load
**Dimensions:** length 241.6 m (792.6 ft); beam 32.6 m (107 ft); draught 12.0 m (39.4 ft)
**Propulsion:** 2-shaft geared steam turbines delivering 100,000 shp (74,570 kW)
**Speed:** 28 kts
**Armament:** one octuple Sea Sparrow SAM launcher with eight missiles, and two 20-mm Phalanx CIWS mountings
**Aircraft:** between one and three Boeing Vertol UH-46D Sea Knight helicopters
**Electronics:** one SPS-10 surface-search radar, one SPS-40 air-search radar, one SPS-58 air-search radar, one SATCOMM system, one SLQ-32(V)3 ESM suite, one URN-20 TACAN, one Mk 36 Super RBOC chaff launcher
**Complement:** AOE1 and AOE2 600, and AOE3 and AOE4 680

***The fast combat support ship USS** Detroit **(AOE4). An idea of her size can be gauged from the fact that she dwarfs the 'Spruance' class destroyer USS** Peterson **(DD969), which is being replenished.***



USA

## 'Cimarron' class fleet oiler

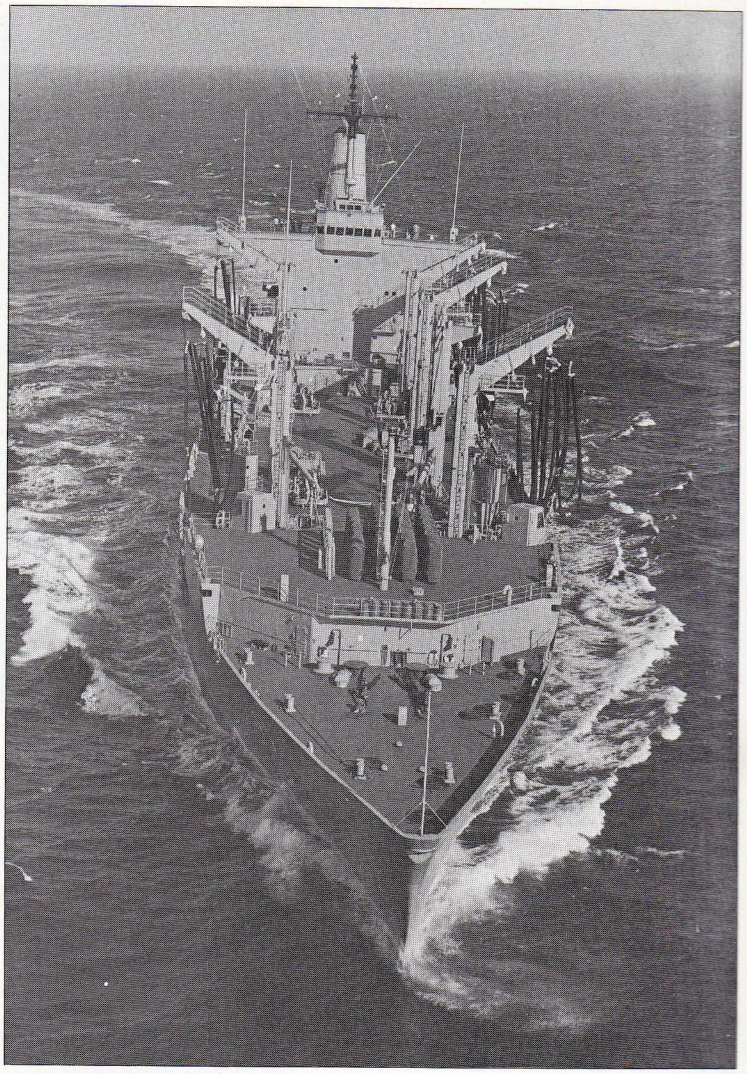
Originally to have been a class of 15 ships, the **'Cimarron' class** of fleet oilers (AO) was built to the extent of only five units because of their limited cargo capacity of 72,000 barrels of fuel oil and 48,000 barrels of JP5 aviation fuel. The cargo is sufficient to provide two complete refuellings of a fossil-fuelled aircraft-carrier battle group with six to eight accompanying escorts. The replacement class is a modification of the commercial variant of the 'Cimarron' design with an increased cargo capacity of 180,000 barrels of petroleum products. To be known as the **'Henry J. Kaiser' class**, 21 units of this type are planned. Each 'Cimarron' has four constant-tension replenishment stations to port and three to starboard, and these can transfer up to 408000 litres (89,750 Imp gal) of fuel oil and 245000 litres (53,894 Imp gal) of JP5 per hour whilst underway at 15 kts. A helicopter VERTREP platform is fitted aft, but no helicopter hangar or support facilities are provided. Two 20-mm Phalanx CIWS mountings are being fitted for self-defence, and the electronic fit is being overhauled. The five 'Cimarron' class units are the USS ***Cimarron*** (AO177), USS ***Monongahela*** (AO178), USS ***Merrimack*** (AO179), USS ***Willamette*** (AO180) and USS ***Platte*** (AO186). The first three were commissioned in 1981, the last two following in 1982 and 1983.

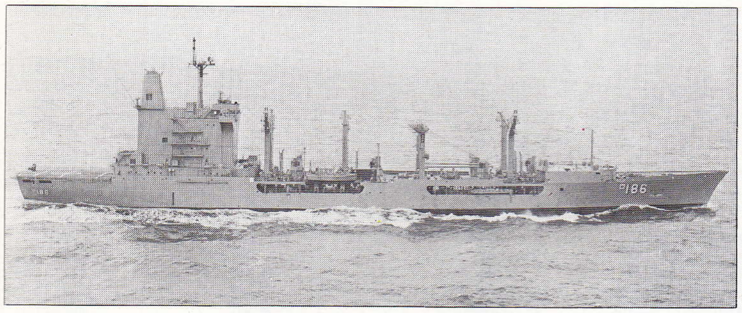
### Specification

**'Cimarron' class**
**Type:** fleet oiler
**Displacement:** 8,210 tons light and 26,110 tons full load
**Dimensions:** length 180.5 m (592.2 ft); beam 26.8 m (88 ft); draught 10.7 m (35 ft)
**Propulsion:** 1-shaft geared steam turbine delivering 24,000 shp (17897 kW)
**Speed:** 20 kts
**Armament:** two 20-mm Phalanx CIWS mountings
**Aircraft:** provision for one helicopter on a landing pad
**Electronics:** one LN-66 navigation radar, one SPS-10 surface-search radar, one SATCOMM system, one Mk 36 Super RBOC chaff launcher
**Complement:** 135

*Right: Lead ship of the 'Cimarron' class oilers, the USS* Cimarron *(AO177) is seen here on full power trials during her fleet acceptance programme in 1980.*

*Below: The 'Cimarron' class oiler USS* Platte *(AO186) in the Gulf of Mexico. The class has been reduced in size to five ships from a planned 20 because their cargo capacity is considered to be inadequate for the tasks assigned to them.*





USSR

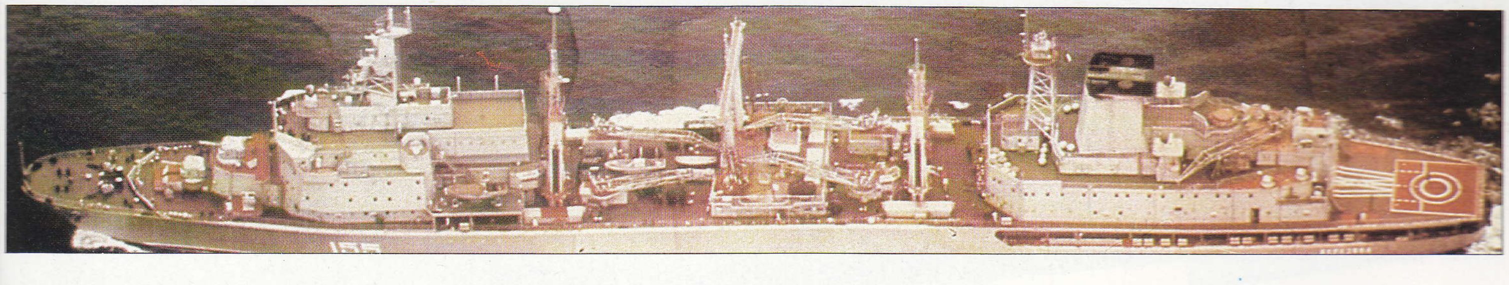
## 'Berezina' class underway replenishment oiler

Completed in 1977 at the 61 Kommuna Shipyard in Leningrad, the ***Berezina*** is unique in the Soviet navy as its largest and most capable replenishment ship, and was designed from the outset to supply petroleum products, munitions, fresh water, stores and provisions. Surprisingly, only one unit has been built to date and this may indicate that she is a prototype (preceding a further class) built to gain operational experience by testing and evaluating the replenishment-at-sea concept for eventual use with the conventional fixed-wing aircraft-carrier force now under construction. The *Berezina* can transfer fuel simultaneously to ships on each beam amidships and astern, whilst special provision is made for replenishing submarines. Four 10-ton capacity cranes are carried for loading stores and servicing ships moored alongside. Solid-cargo transfer underway is accomplished by two sliding-stay constant-tension transfer rigs on each side. VERTREP operations are carried out by the two Kamov Ka-25 'Hormone-C' utility helicopters with loads being slung beneath them. The cargo capacity is estimated at 16,000 tons of petroleum products, 5000 tons of fresh water and 3,000 tons of munitions, spares and victuals. The large crew carried is thought to include two or three spare crews for submarines. The *Berezina* has the Soviet designation *Voyennyy Transport* (VTR) or military transport.

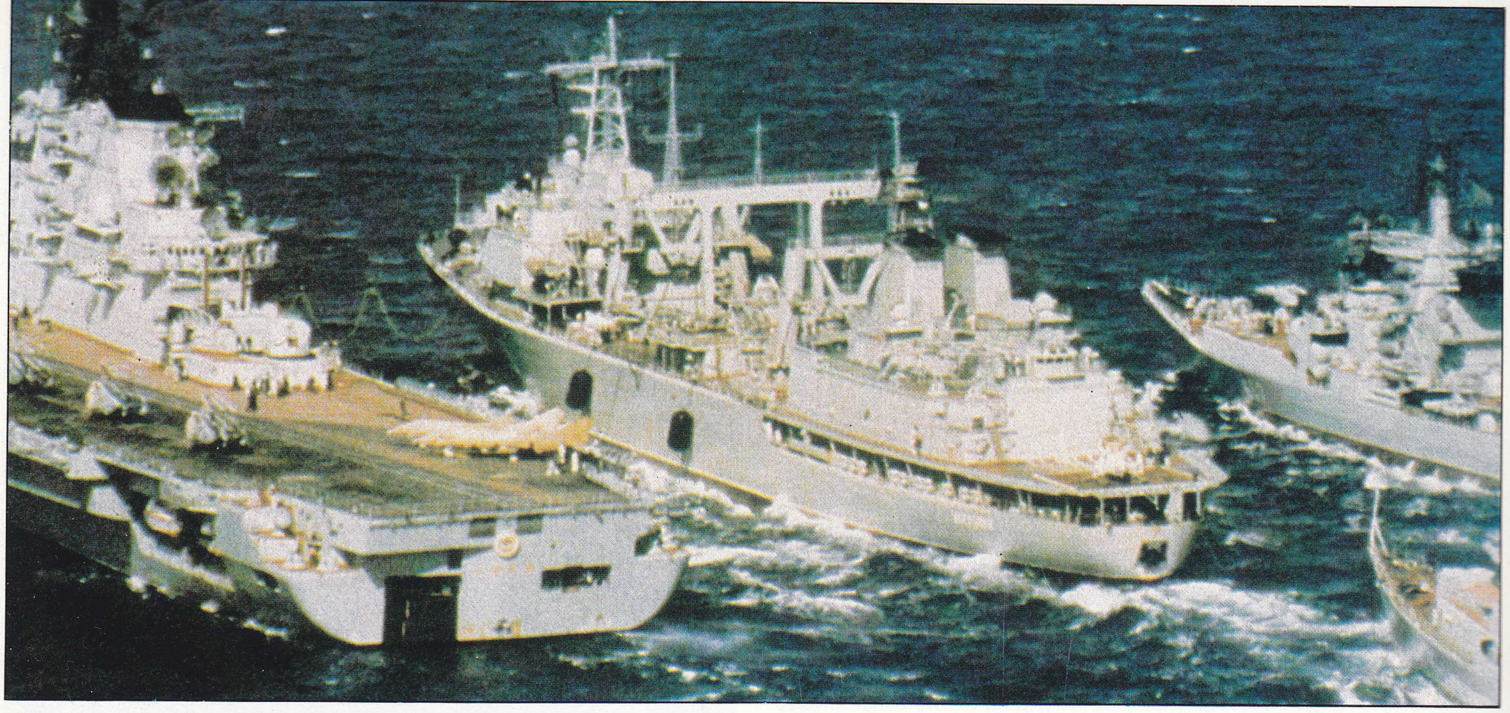
### Specification

**'Berezina' class**
**Type:** underway replenishment oiler
**Displacement:** 14,000 tons light and 40,000 tons full load
**Dimensions:** length 212.0 m (695.5 ft); beam 26.0 m (85.3 ft); draught 12.0 m (39.4 ft)
**Propulsion:** 2-shaft diesels delivering 54,000 shp (40268 kW)
**Speed:** 22 kts
**Armament:** one twin SA-N-4 'Gecko' SAM launcher with 18 missiles, two twin 57-mm AA and four 30-mm ADG6-30 AA guns, and two RBU 1000 anti-submarine rocket launchers
**Aircraft:** two Kamov Ka-25 'Hormone-C' helicopters
**Electronics:** two 'Don Kay' navigation radars, one 'Don-2' navigation radar, one 'Strut Curve' air-search radar, one 'Muff Cob' 57-mm fire-control radar, one 'Pop Group' SAM fire-control radar, two 'Bass Tilt' CIWS fire-control radars, one medium-frequency hull sonar, one 'High Pole-A' IFF, two twin chaff launchers
**Complement:** 600

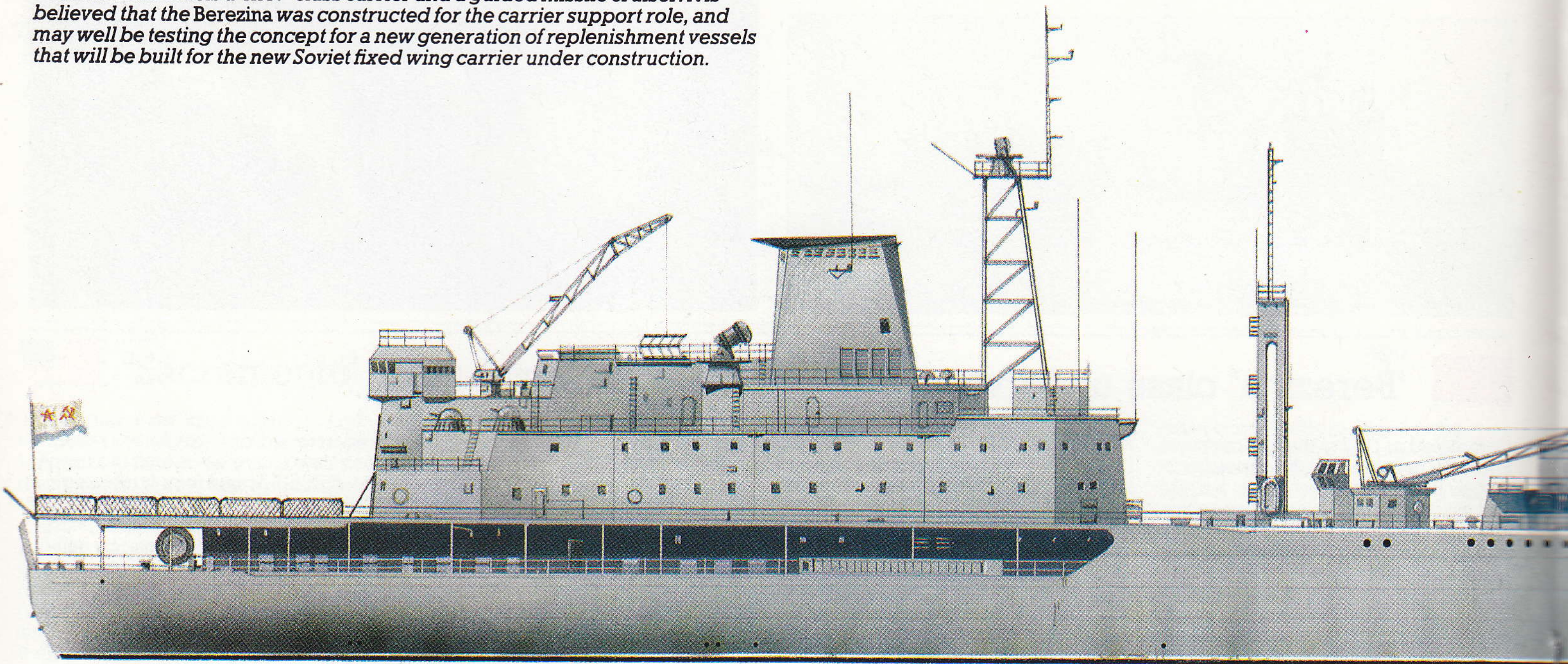
***The* Berezina *is now the only Soviet replenishment ship to carry armament with both surface-to-air missiles, AA guns and RBU multiple ASW rocket launchers. Two Kamov Ka-25 'Hormone-C' utility helicopters are also embarked for vertical replenishment operations of warships.***

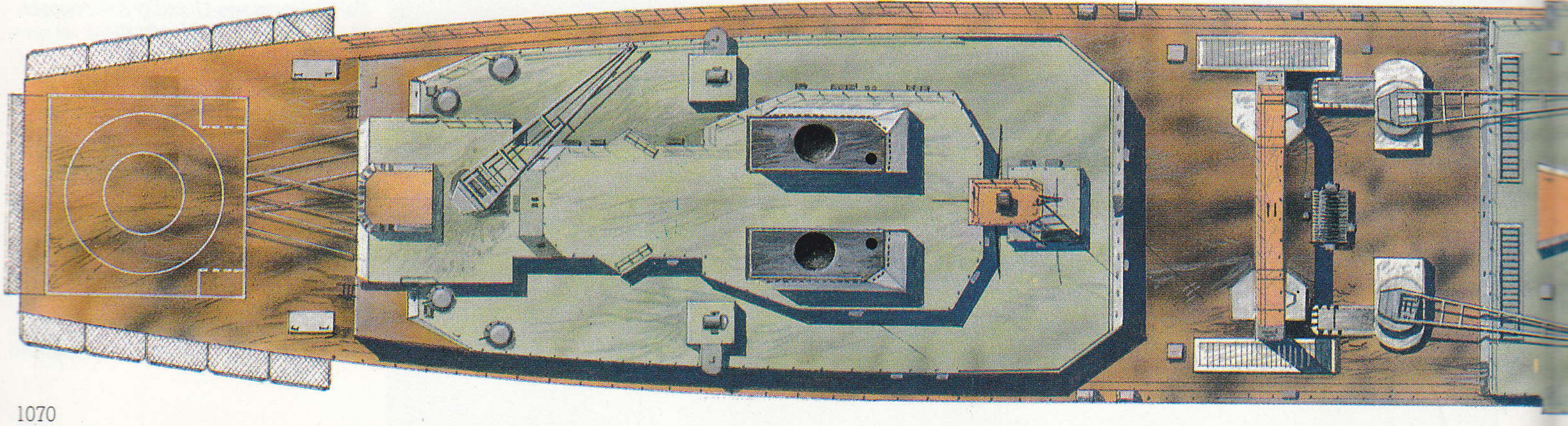


# *Berezina* Underway Replenishme



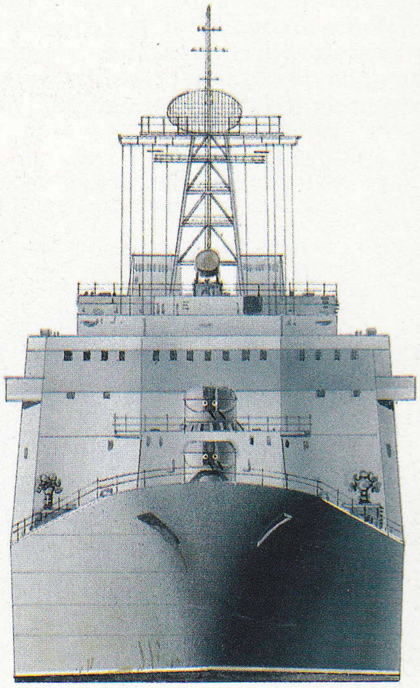
*The* Berezina *refuels a 'Kiev' class carrier and a guided missile cruiser. It is believed that the* Berezina *was constructed for the carrier support role, and may well be testing the concept for a new generation of replenishment vessels that will be built for the new Soviet fixed wing carrier under construction.*

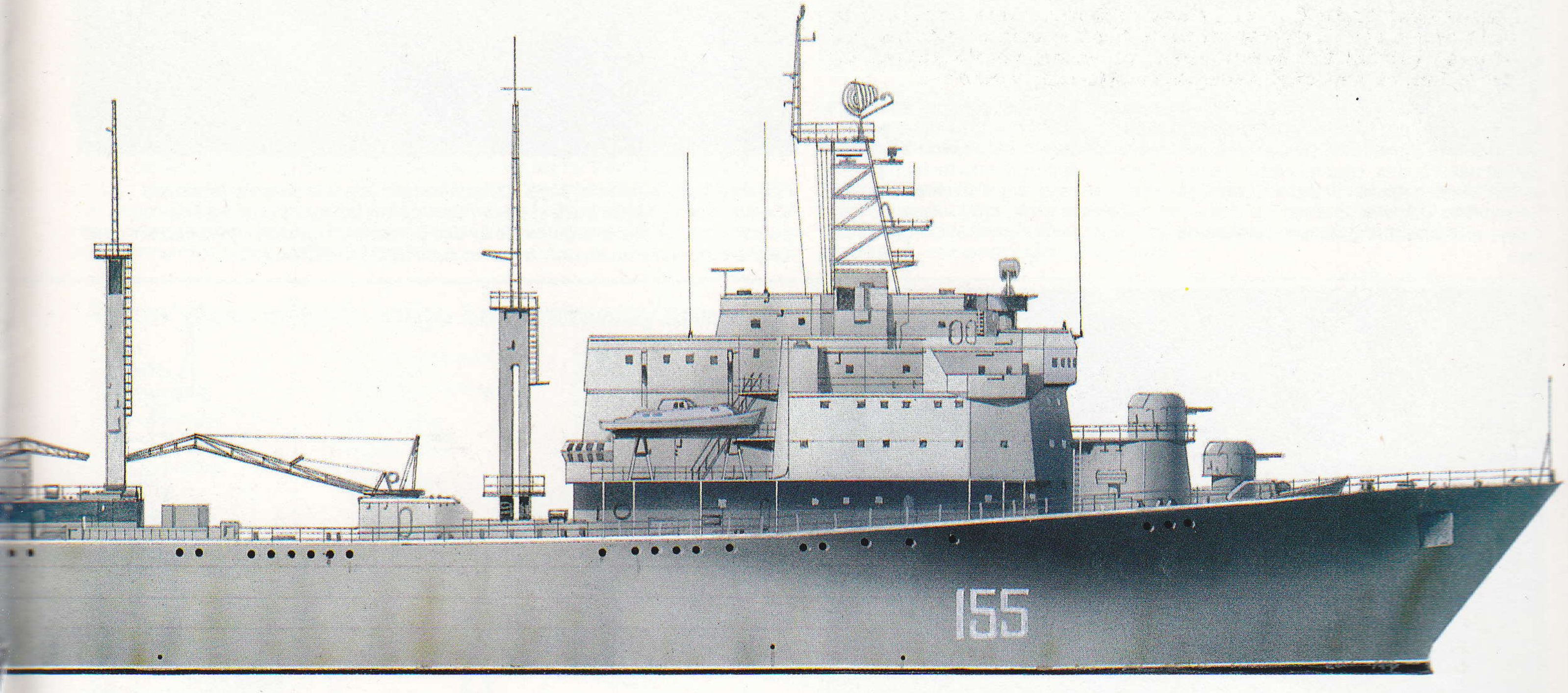


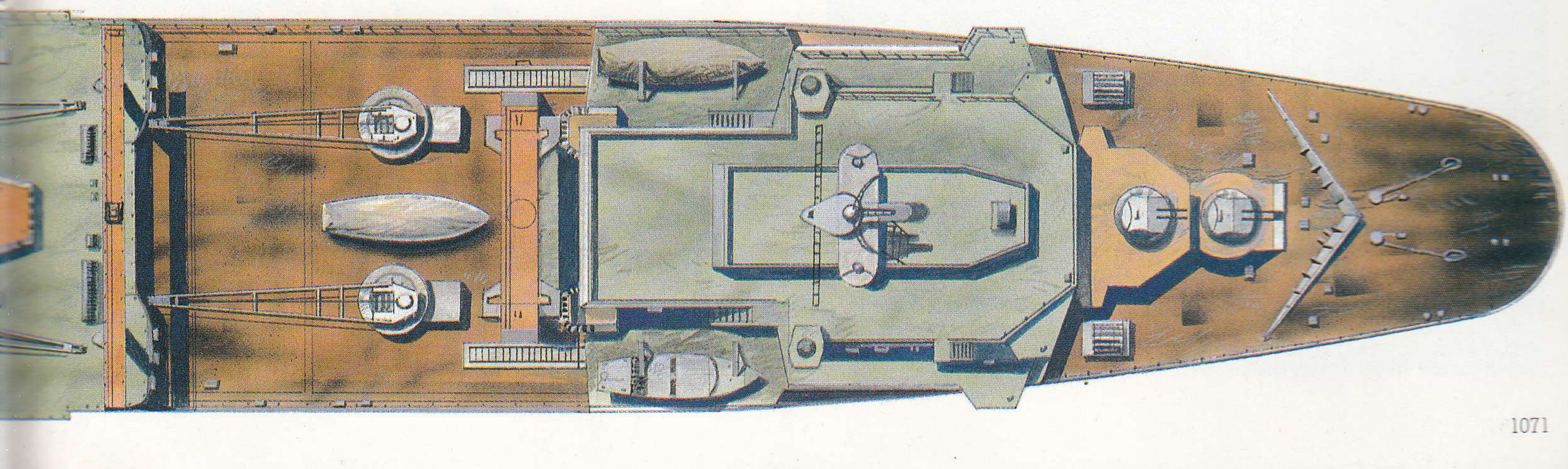


# nt Oiler

*The only Soviet replenishment ship comparable to the US Navy's large AOR/AOE ships is the replenishment oiler* Berezina, *which can supply petroleum products, munitions, stores and fresh water to ships on either side and fuel to a ship astern. Armament is extremely heavy for a ship of this type, comprising a twin SA-N-4 SAM launcher, two twin 57-mm guns with four Gatling-type 50-mm close-in weapon systems, and two RBU 4500A six-barrelled ASW rocket launchers. If the two Kamov Ka-25 'Hormone' helicopters carried retain their ASW capacity, then* Berezina *has a considerable defence against hostile submarines.*







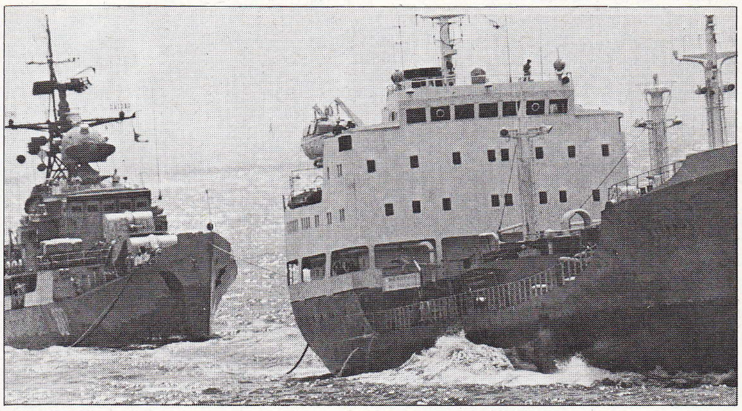
# The Soviet Support Ship

*The massive growth in Soviet naval capability since the 1950s has made Soviet warships a familiar sight on the oceans of the world. With a limited number of friendly ports, however, Soviet vessels spend much time at deep water anchorages, relying upon the support of replenishment ships, repair and depot vessels and the Soviet merchant fleet.*

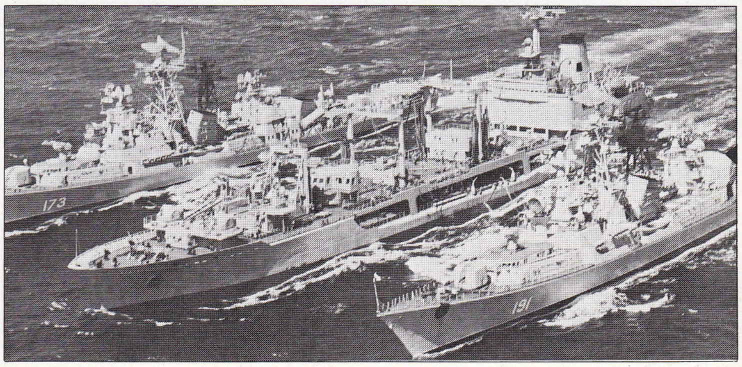
The Soviet navy has an extensive auxiliary force that can be divided into a number of categories. Although not as experienced or advanced in the use of UNREP ships, the Soviet navy employs oilers and tankers to carry fuels for Soviet surface combatants and submarines, the Western categories for at-sea replenishment and point-to-point bulk fuel transport being covered by the Soviet designation *Voyennyy Tanker* (VT, for military tanker). There is only one ship, the *Berezina*, comparable with the US Navy's large AOR/AOE classes in supplying all types of cargo by underway replenishment or VERTREP helicopter operation. Given the designation *Voyennyy Transport* (VTR, for military transport), she shares this with a number of cargo vessels employed by the Soviet navy, which has long used tankers from the merchant fleet for replenishment-at-sea purposes. Until the mid-1960s both these and the Soviet navy tankers practised refuelling only with warships that were dead in the water or whilst the vessels were being towed with the refuelling line over the stern. In the late 1960s and early 1970s a number of UNREP-capable tanker classes were acquired, whilst older vessels were given limited abeam refuelling points. The acquisition of these classes appears to have halted in early 1979 when the last of four 'Dubna' class vessels was taken into service. In comparison with the US Navy's oilers these classes are smaller and slower, and lack VERTREP helicopter facilities.

In terms of importance to the overall combat proficiency of the Soviet navy, the next important support ship category are the missile transport and ammunition ships. These carry either reload SLBMs for strategic missile submarines or tactical anti-ship cruise missiles for the surface fleet and cruise-missile submarine force. In wartime the SLBM carriers would provide a valuable reload capability for the Soviet second-strike forces, especially during a protracted nuclear conflict, as they can deploy to remote sea areas distant from the primary naval and submarine bases which would be priority targets in such a conflict. The other vessels, as shown by their heavy AA armament, will be deployed to forward areas for the rapid resupply of surviving missile combatants after the initial strikes.

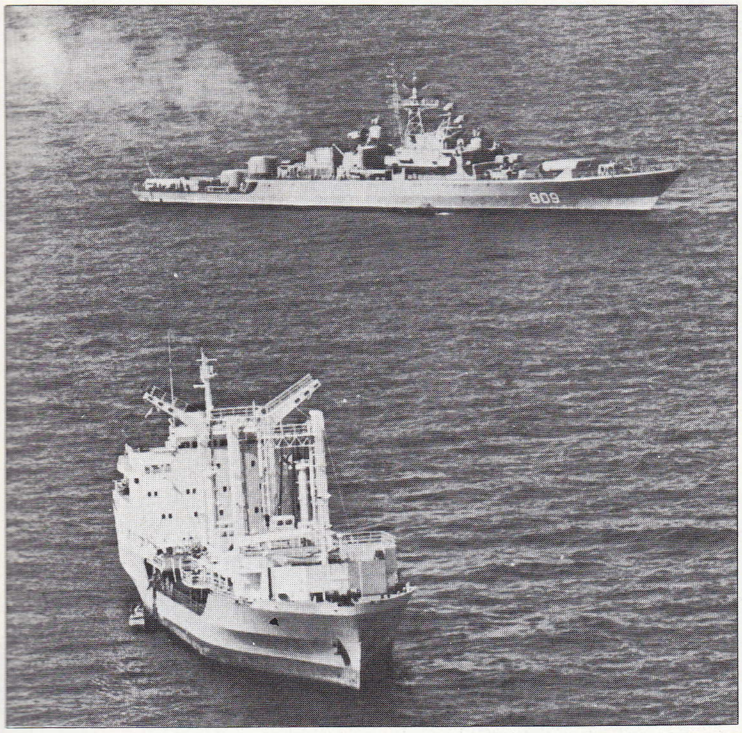
The *Plavuchaya Baza* (PB, or floating base) submarine support ships are similar in concept to their Western equivalent, the AS. They provide specialist services and logistic support to conventional and nuclear submarine flotillas in Soviet naval bases, coastal waters, and on forward deployments to such places as the Mediterranean and the Caribbean. The 'Don' and 'Ugra' classes can also function as command ships for Soviet surface task groups by virtue of their heavy armament and extensive command, control and communications facilities.



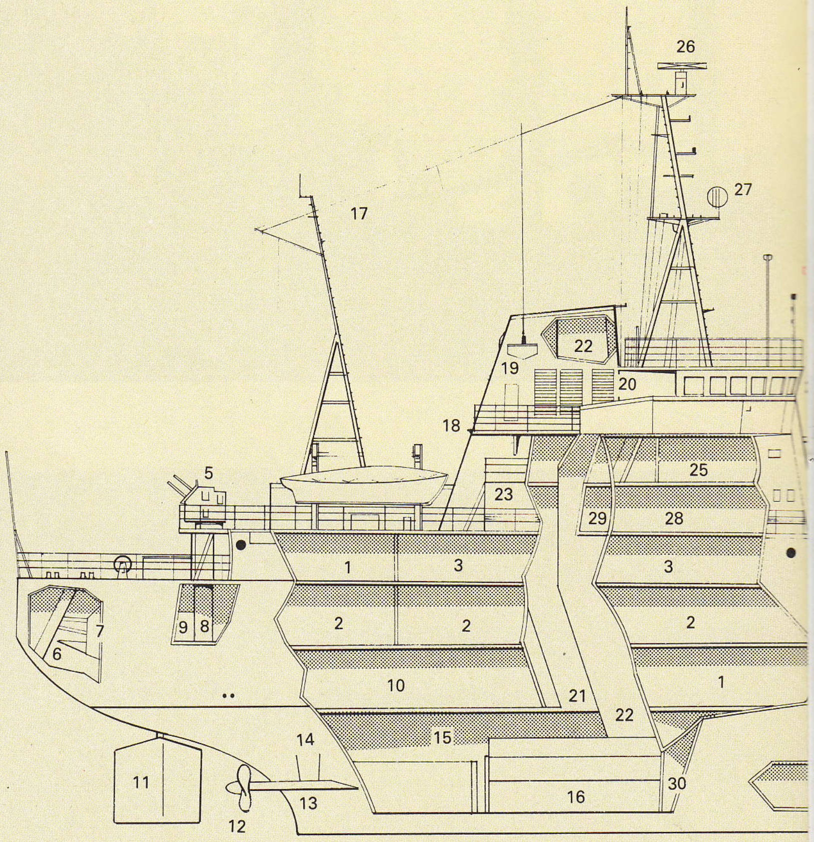
*For many years the only way a Soviet tanker could refuel a warship was by trailing a hose over the stern whilst towing the vessel slowly. This shot of an 'Altay' class oiler refuelling a 'Riga' class frigate shows the method in use off the Philippines during one of the worldwide Ocean fleet exercises.*

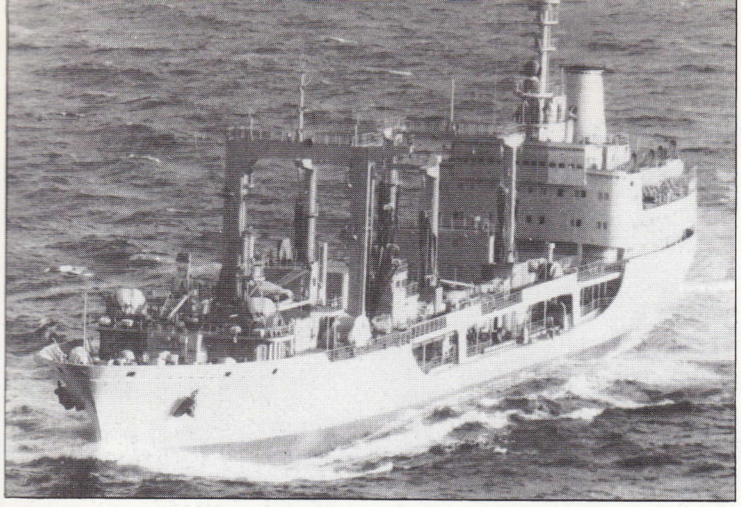


*The replenishment oiler* Boris Chilikin *refuels two gas turbine-powered 'Kashin' class missile destroyers off Sardinia in the mid 1970s. She can also transfer provisions to either side by use of constant tension rigs. Later ships of the six-vessel class can only transfer such items to starboard.*

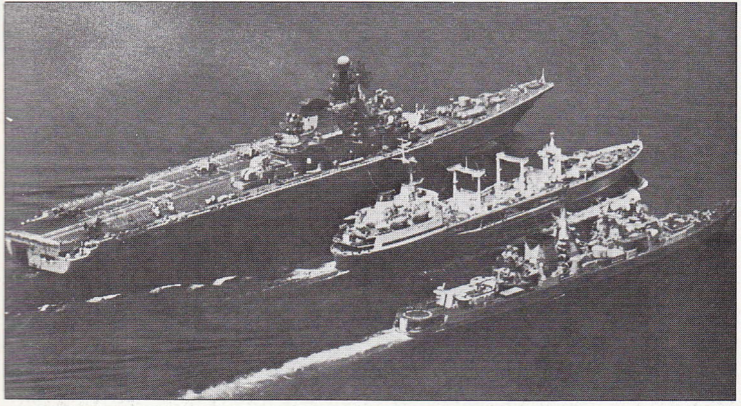


*A 'Dubna' class replenishment oiler, the* Irkut, *with a 'Krivak I' class frigate in the background. The four 'Dubna' class can transfer fuel and dry stores to ships on either beam and fuel to a ship astern. Both the* Irkut *and her sister ship, the* Dubna, *were used initially to resupply both Soviet navy vessels and units from the Soviet fishing fleet.*

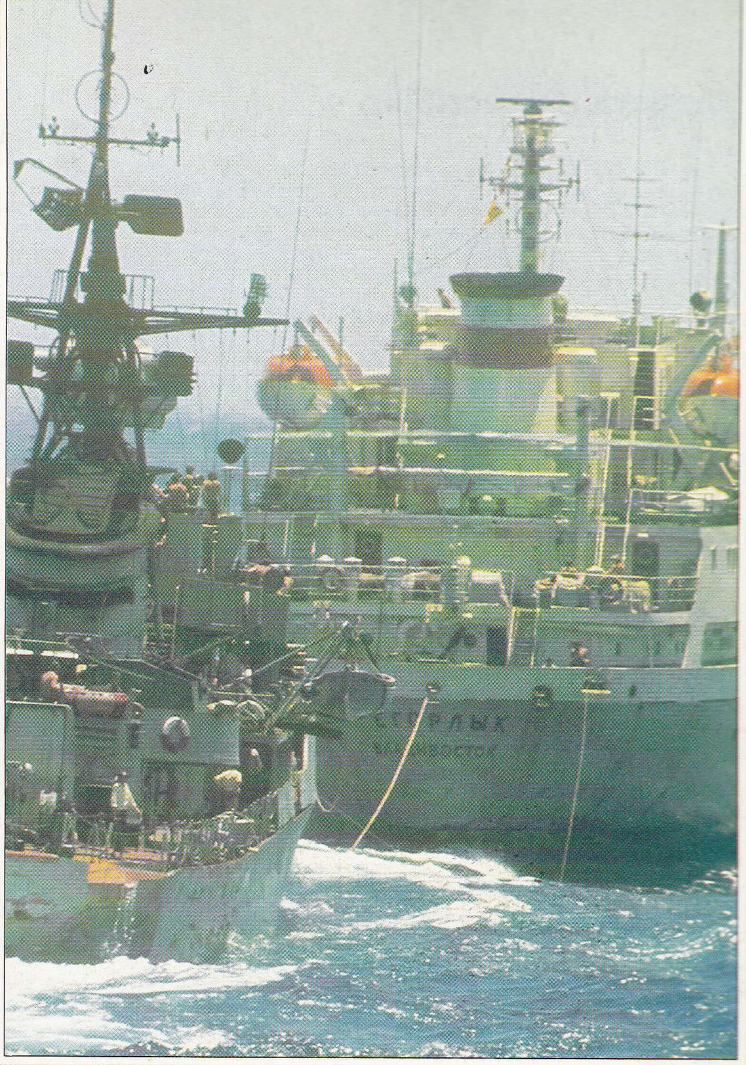




*One of the four 'Boris Chilikin' class replenishment oilers that were completed with four 57-mm AA guns in twin turrets forward as well as 'Muff Cob' fire control radar and a 'Strut Curve' air search radar. Both the guns and radar were deleted from the class at the time the* Berezina *entered service.*



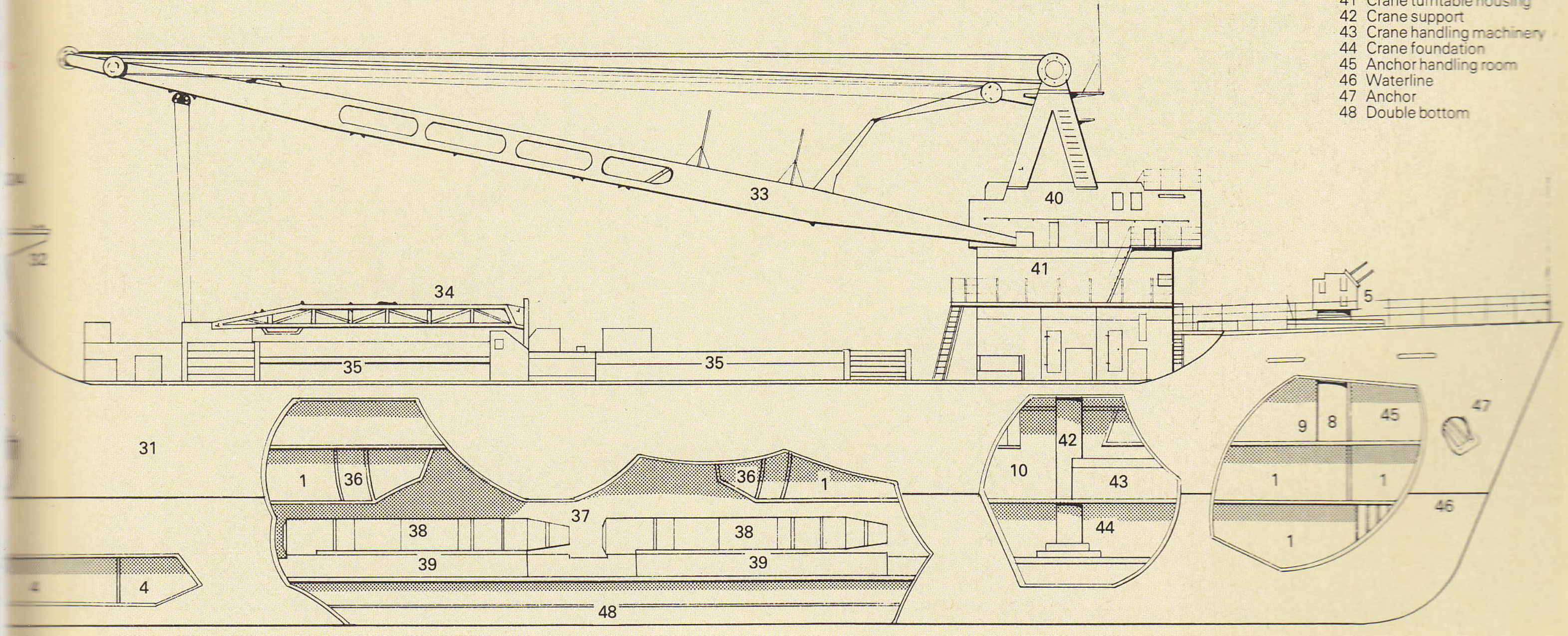
*The* Boris Butoma *refuels the aircraft carrier* Minsk *and a 'Kara' class missile cruiser in the Pacific during a 1982 deployment. The limited cargo capacity of the 'Boris Chilikin' class means that she would probably have had to rendezvous with a civilian Soviet tanker to replenish her load before attempting any further refuelling task.*



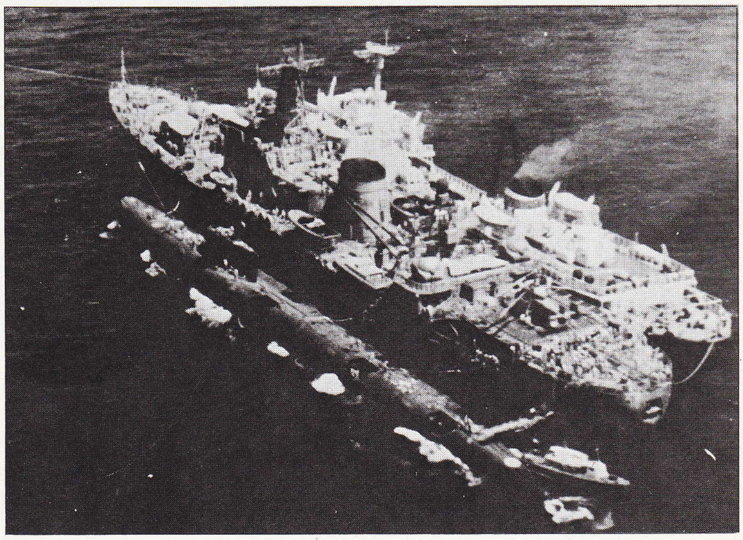
*A view from astern of a 'Riga' class frigate of the Soviet refuelling technique of towing the warship whilst it takes on fuel. Although this method has some advantages it makes both ships highly vulnerable to attack during the operation, as it is very slow to execute.*

## 'Amga' class missile cargo boat cutaway drawing key

1 Stores
2 Crew quarters
3 Officers' quarters
4 Fuel tanks
5 Twin 25-mm/70 AA mounts
6 Stern door
7 Stern door handling machinery
8 Ammunition hoist and turning gear
9 Ammunition handling/storage area
10 Machine shop
11 Balanced rudder
12 Propellers (twin)
13 Shaft
14 Prop support
15 Engine room
16 Diesel engine
17 Wireless aerials
18 Aft bridge
19 Funnel casing (twin funnels)
20 Ventilator intake
21 Ventilator shaft
22 Funnel uptake
23 Wireless room
24 Navigation bridge
25 Chart room
26 'Don 2' navigation radar
27 'Strut Curve' radar
28 Command centre
29 Companionway between twin funnels
30 Wing passages
31 Ice-strengthened hull
32 Support platform for boom end
33 Boom
34 Gantry
35 Cover to hold
36 Companionway
37 Missile hold
38 SS-N-6 20-ton missile reloads for 'Delta' class submarines
39 Missile supports
40 Control cab for 50-ton crane
41 Crane turntable housing
42 Crane support
43 Crane handling machinery
44 Crane foundation
45 Anchor handling room
46 Waterline
47 Anchor
48 Double bottom



# The Soviet Support Ship



***An 'Ugra' class submarine support ship with an 'Uda' class tanker and an 'Echo II' class cruise missile submarine alongside. The 'Ugra' class vessels are enlarged versions of the previous 'Don' class submarine support ships, and have extensive workshops for maintaining and repairing the vessels whilst they lie alongside.***

The new 22,500-ton 'El'brus' class provides the world's largest examples of the submarine salvage and rescue type, giving extensive underwater recovery capacity in the form of diving facilities and two submersibles of the type used by the 'India' class rescue submarines. Designated *Spasatel'noye Sudno* (SS, or salvage ship) the two 'El'brus' class and 29 other Soviet navy salvage ships of various types can handle practically any marine emergency, afloat or on the sea bed.

To perform maintenance and repair tasks afloat the Soviets have six classes of repair ships (the 'Dnepr I', 'Dnepr II', 'Oskol I', 'Oskol II', 'Oskol III' and 'Amur') totalling 38 vessels. These units have engineering workshops and light cranes, and carry spare parts for the various classes they service. They either operate in Soviet coastal waters or forward deploy to make 'running' repairs to broken down surface ships or submarines in order that they can return to a more extensively equipped repair shipyard in the Soviet Union. Normally given the designation *Plavuchaya Masterkaya* (PM, or floating workshop), a unit of the type is now deployed to the Vietnamese naval base at Cam Ranh Bay.

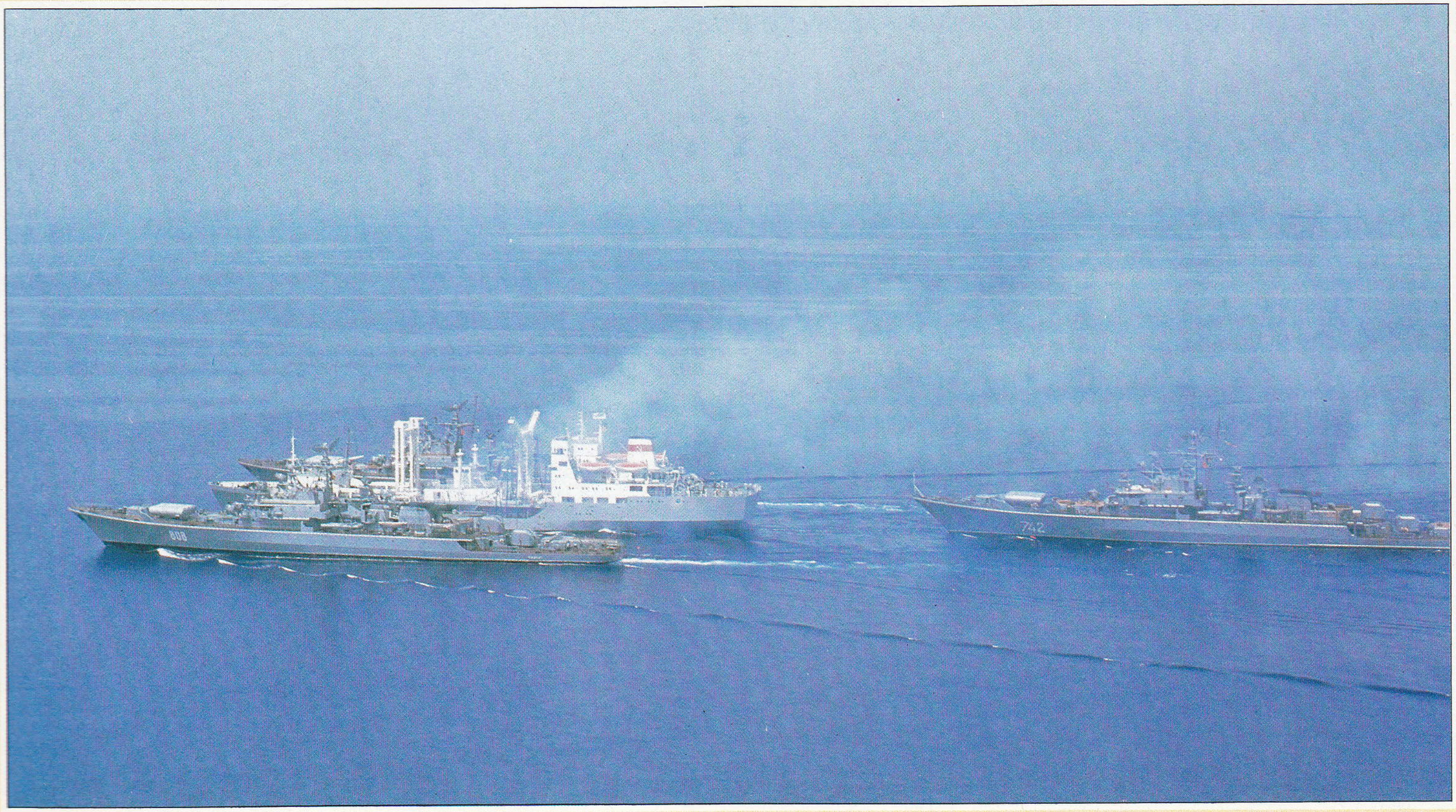
To support these vessels and the salvage ships the Soviet navy maintains a large force of *Morskoy Buksir* (MB) seagoing tugs that can also serve as limited-capability salvage vessels and fire-fighting units if required. These vessels are often seen towing home broken-down Soviet warships and submarines. Several are also configured to serve as *Spasatel'nyy Buksir* (SB) rescue tugs capable of performing deep-ocean rescue missions. Others (like seven of the 15 naval icebreakers) have been armed to serve with the KGB maritime border troops, who use them to patrol the inhospitable northern and eastern coastlines of the Soviet Union for intruders and people attempting to escape.

Surprisingly enough, the Soviets have the only navy currently with hospital ships in commission. The two modern 11,000-ton 'Ob' class vessels are civilian-manned, but have a Soviet navy captain 3rd rank in command. They were the world's first purpose-built hospital ships, with seven operating tables, 200 naval medical staff and a hangar for a casualty-evacuation version of the Kamov Ka-25 'Hormone-C' utility helicopter.

Seven *Ucheknoye Sudno* (US) training ships are included amongst the support ship forces as they are responsible for training cadets from the Soviet naval academies. They also have other duties in wartime, as demonstrated by the 'Smol'ny' class with its heavy armament.

In addition to the types described above there are other classes, plus the entire Soviet merchant marine which is available to support the Soviet military forces all over the world. For instance, should a Soviet surface combat ship run low on supplies in an area with no friendly support ships or ports available, the nearest merchant marine freighter will be diverted (no matter her commercial commitments) to enter the nearest port and top up her bunkers and provisions for retransfer at sea to the warship before resuming her voyage. The Soviet fishing fleets also provide world-wide aid to Soviet warships, and have on several occasions been the first Soviet vessels of any description to arrive in the vicinity of warships and submarines that have suffered mechanical breakdowns or accidents, then providing support such as fire fighting materials. The civilian Space Event Support Ships regularly seen throughout the world on various duties also have important military functions as secondary intelligence-gatherers and military communications relay ships with their extensive satellite antenna systems. Various types of civilian oceanographic research vessel and some of the merchant marine icebreakers and training vessels are also regularly used to support naval activities.

Although the Soviets do not deploy as comprehensive a fleet support capability as the Americans, in wartime they will be able to muster the largest number of auxiliaries ever fielded in a war simply by converting their merchant marine into an auxiliary service of the navy by issuing a set of orders to formalize arrangements already in being. Whether the Soviets will copy the US Navy's UNREP class is debatable as there is no apparent sign of a follow-on to the *Berezina*. However, once the conventional fixed-wing carrier force is established the current state of affairs is expected to change rapidly.



***Three 'Krivak' class frigates reveal the refuelling stations available aboard 'Dubna' class vessels. Smaller and slower than Western equivalents, the 'Dubnas' lack helicopter facilities.***

USSR

# 'Boris Chilikin' class replenishment oiler

The **'Boris Chilikin' class** is the naval version of the 'Velikiy Oktyabr' merchant tanker design, which has been built for the Soviet merchant fleet and export. The class comprises the first Soviet navy purpose-built underway replenishment ships capable of supplying both liquid fuels and solids. The designed cargo capacity is 13,000 tons of diesel and fuel oil, 500 tons of fresh water, 400 tons of provisions, 400 tons of stores and spares, and 400 tons of munitions. The earlier units can supply the solids on constant-tension rigs to both sides forward, whilst the later units can supply them only to starboard, with liquids to port at the equivalent stations. All six vessels built so far (***Boris Chilikin, Boris Butoma, Dnestr, Genrikh Gasanov, Ivan Bubnov*** and ***Vladimir Kolyyachitskiy***) can suply liquids to each side amidships and astern. The first four ships were completed with two twin 57-mm AA mountings, a 'Muff Cob' fire-control radar and a 'Strut Curve' air-search radar. All these systems were subsequently removed, the last two units being completed in standard merchant ship configuration. Several more units are expected to be built at the production facility at the Baltic Shipyard, Leningrad, over the next few years. The Soviet navy designation is *Voyennyy Tanker* (VT) or military tanker.

## Specification

**'Boris Chilikin' class**

**Type:** replenishment oiler

**Displacement:** 8,750 tons light and 24,450 tons full load

**Dimensions:** length 162.2 m (532.2 ft); beam 21.4 m (70.2 ft); draught 11.5 m (37.7 ft)

**Propulsion:** 1-shaft diesel delivering 9,600 hp (7159 kW)

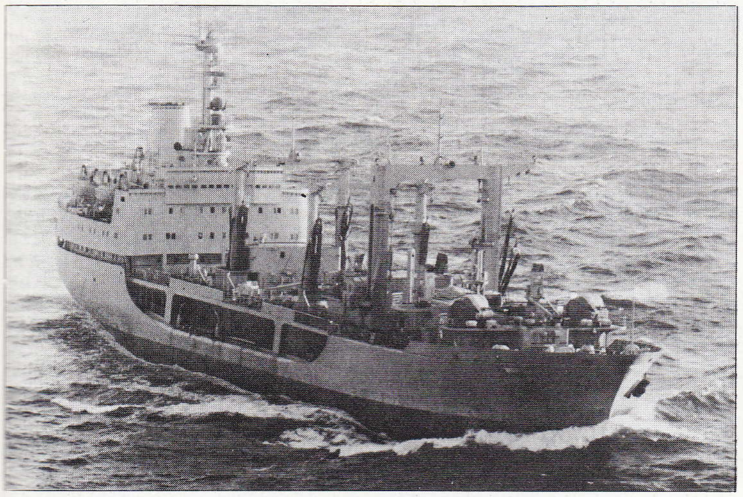
**Speed:** 16.5 kts

**Armament:** see text

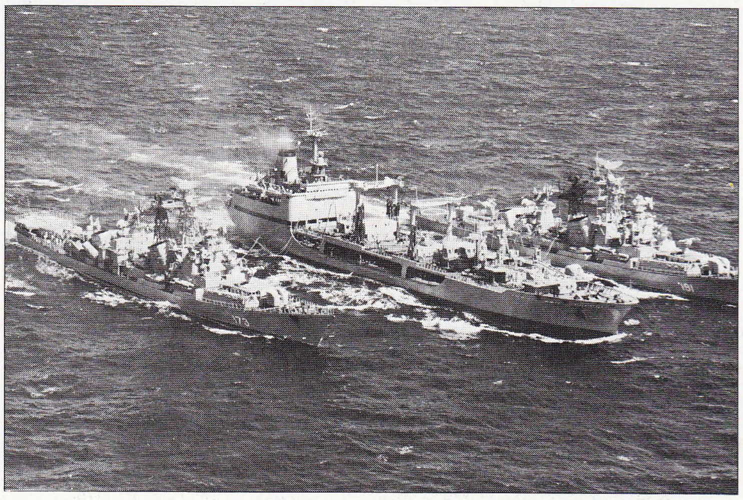
**Aircraft:** none

**Electronics:** two 'Don Kay' navigation radars, and see text

**Complement:** 150



***One of the early 'Boris Chilikin' class replenishment oilers equipped with two twin 57-mm AA guns. The last two units completed were configured as merchant vessels without armament, but have the Soviet navy designation of Voyennyy Tanker (VT).***

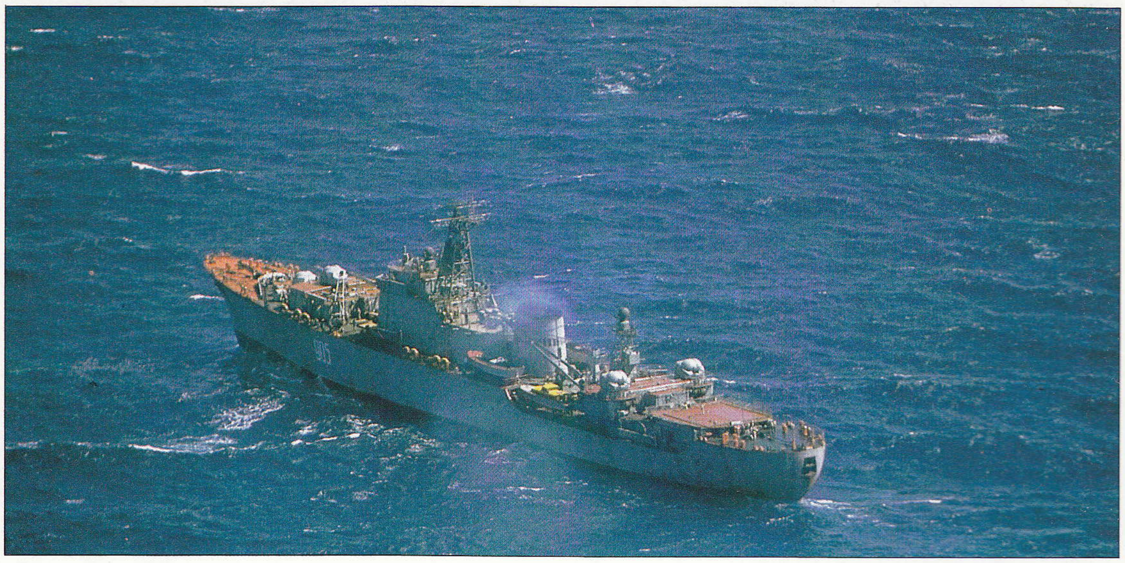


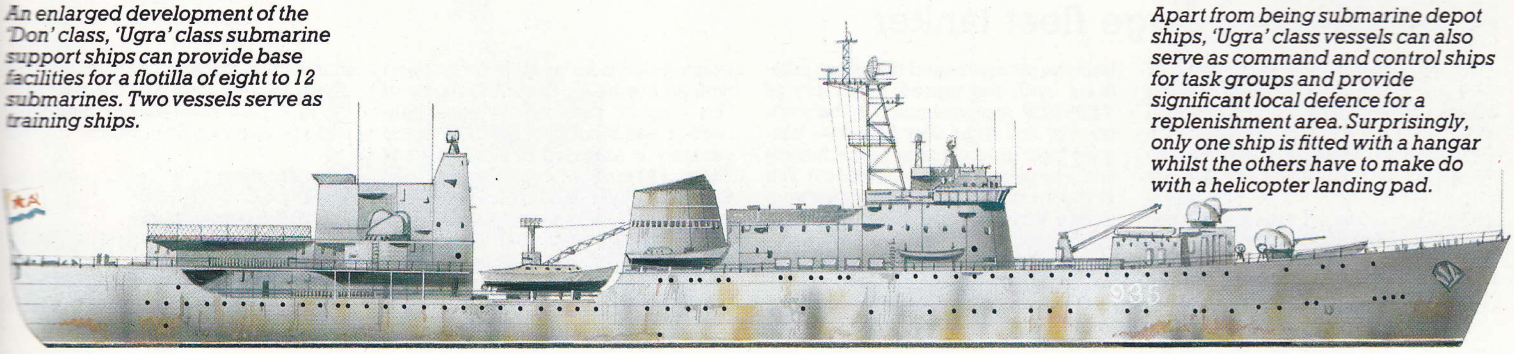
***The* Boris Chilikin *refuels two 'Kashin' class destroyers. The capacity to refuel warships under way increases the mobility of the Soviet navy and considerably reduces warship vulnerability during UNREP operations.***

USSR

# 'Ugra' class submarine support ship

Built in the period 1963-72 at Nikolayev, the **'Ugra' class** is an enlarged version of the 'Don' class submarine tender design with a larger forward superstructure that stretches aft to a shorter funnel. Designated *Plavuchaya Baza* (PB, or floating base) by the Soviets, all are fitted with one 10-ton and two 6-ton capacity cranes. Since the ships were built many modifications have been made so that the class can now be divided into three sub groups. One unit, the ***Ivan Kolyshkin***, has been fitted with a hangar for a single Kamov Ka-25 'Hormone-C' utility helicopter whilst the remainder only have a helicopter landing pad. Several, including the ***Volga*** and ***Ivan Kucherenko***, incorporate a larger aft lattice mast topped by a twin 'Vee Cone' communications antenna. The design allows for extensive engineeŕing workshops and can provide logistic support for a submarine flotilla (of between eight and 12 boats that moor alongside) by providing diesel fuel,





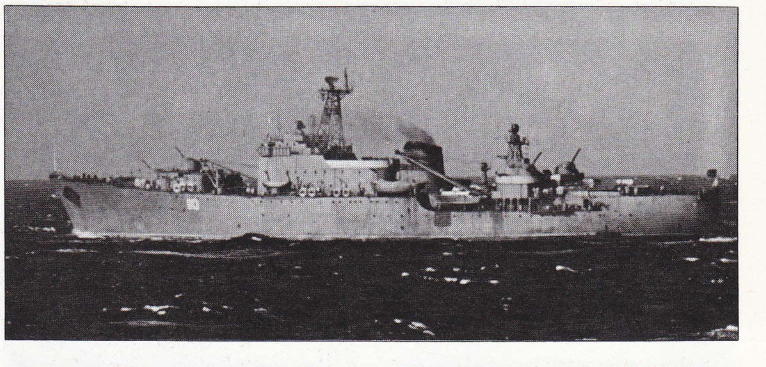
***An enlarged development of the 'Don' class, 'Ugra' class submarine support ships can provide base facilities for a flotilla of eight to 12 submarines. Two vessels serve as training ships.***

***Apart from being submarine depot ships, 'Ugra' class vessels can also serve as command and control ships for task groups and provide significant local defence for a replenishment area. Surprisingly, only one ship is fitted with a hangar whilst the others have to make do with a helicopter landing pad.***

### 'Ugra' class submarine support ship (continued)

fresh water, provisions, spares, torpedo reloads and fresh crews. The 'Ugras' are also frequently used as Soviet navy task group flagships. The sixth unit was completed to a modified design and sold to the Indian navy as the ***Amba*** to support India's flotilla of 'Foxtrot' class submarines. Two further vessels, the ***Gangut*** and the ***Borodino***, were configured whilst building to serve as training ships for naval officer cadets. The 'Ugra' class proper totals seven ships, comprising the three mentioned above, the ***Ivan Vakhrameev***, the ***Tobol***, and two further units whose names are unknown.

**Specification**
**'Ugra' class**
**Type:** submarine support ship
**Displacement:** 6,750 tons standard and 9,600 tons full load
**Dimensions:** length 145.0 m (475.7 ft); beam 17.7 m (58.1 ft); draught 6.4 m (21 ft)
**Propulsion:** 2-shaft diesels delivering 14,000 hp (10440 kW)
**Speed:** 17 kts
**Armament:** two quadruple SA-N-5 'Grail' SAM launchers with 16 missiles, and four twin 57-mm AA guns
**Aircraft:** provision for a helicopter on a landing pad, except *Ivan Kolyshkin* which has one Kamov Ka-25 'Hormone-C' light helicopter
**Electronics:** between one and three 'Don-2' navigation radars, one 'Strut Curve' air-search radar, two 'Muff Cob' 57-mm fire-control radars, four 'Watch Dog' ECM systems, one 'High Pole-A/B' IFF, two 'Square Head' IFF
**Complement:** 450



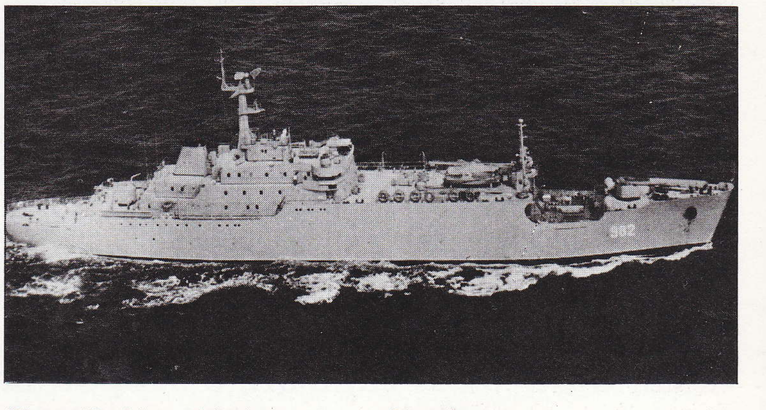
***The heavy AA armament of the 'Ugra' class submarine depot ships can be seen here with all four twin 57-mm guns at high elevation. To further enhance the close-range air defence of the ships two quadruple SA-N-5 'Grail' SAM launchers are also being fitted so that they can survive in forward operational areas.***

USSR

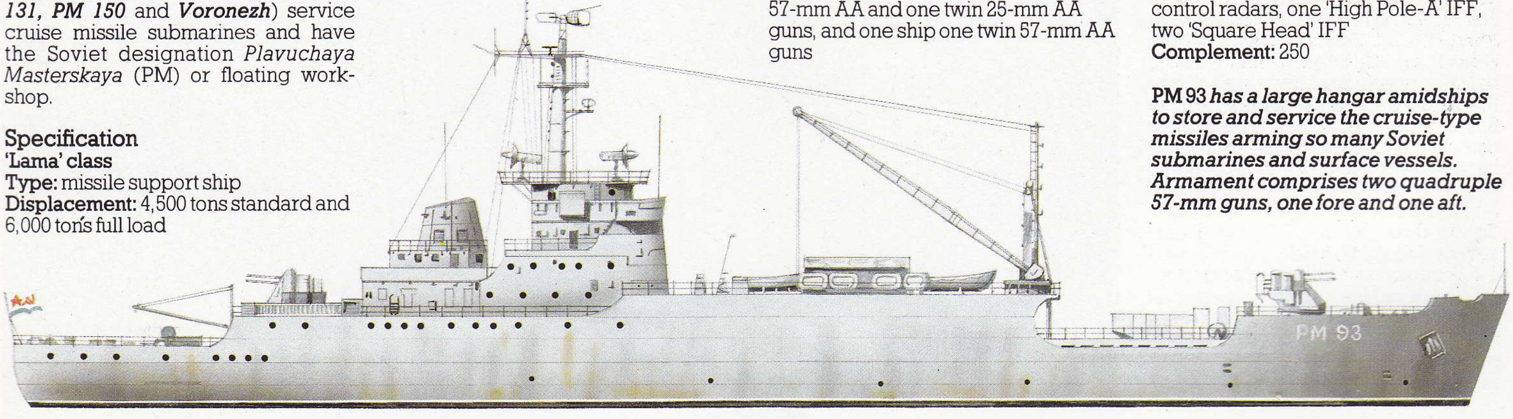
## 'Lama' class missile support ship

Built in the period 1963-72 (with a seventh vessel added in 1979) the **'Lama' class** are missile transports which carry and service cruise missiles for surface ships and submarines. The engine room is sited aft to allow for a very spacious hangar arrangement amidships for stowage of the missiles. A set of hangar doors opens forwards to the point where a 12.2-m (40-ft) well deck with railway tracks is served by two 20-ton capacity travelling cranes that lift the missiles from the horizontal to the vessels being rearmed. For ships with low freeboards to come alongside mooring points are located along both hull sides. Two of the class, the ***General Ryakikov*** and ***PB 625***, are rated as PBs and have enlarged missile stowage hangars, a smaller working deck and 10-ton capacity cranes for servicing the 'Osa', 'Matka' and 'Nanuchka' classes of missile craft. The remaining five units (***PM 44, PM 93, PM 131, PM 150*** and ***Voronezh***) service cruise missile submarines and have the Soviet designation *Plavuchaya Masterskaya* (PM) or floating workshop.

**Specification**
**'Lama' class**
**Type:** missile support ship
**Displacement:** 4,500 tons standard and 6,000 tons full load
**Dimensions:** length 112.8 m (370.1 ft); beam 14.9 m (48.9 ft); draught 4.4 m (14.4 ft)
**Propulsion:** 2-shaft diesels delivering 5,000 hp (3729 kW)
**Speed:** 14 kts
**Armament:** four quadruple SA-N-5 'Grail' SAM launchers with 32 missiles (*General Ryabikov* only), plus a gun armament that varies considerably, two ships having two quadruple 57-mm AA guns, one ship one quadruple 57-mm AA guns, two ships one twin 57-mm AA and one twin 25-mm AA guns, and one ship one twin 57-mm AA guns
**Aircraft:** none
**Electronics:** one 'Don-2' navigation radar, one 'Slim Net' or 'Strut Curve' air-search radar, one or two 'Hawk Screech' or 'Muff Cob' 57-mm fire-control radars, one 'High Pole-A' IFF, two 'Square Head' IFF
**Complement:** 250



***A modified 'Lama' class missile transport/tender with smaller cranes, enlarged superstructure and additional gun mount aft of the mast. She is tender to 'Nanuchka', 'Matka' and 'Osa' class missile craft, and carries and services SS-N-2 and SS-N-9 missiles for them.***



***PM 93 has a large hangar amidships to store and service the cruise-type missiles arming so many Soviet submarines and surface vessels. Armament comprises two quadruple 57-mm guns, one fore and one aft.***

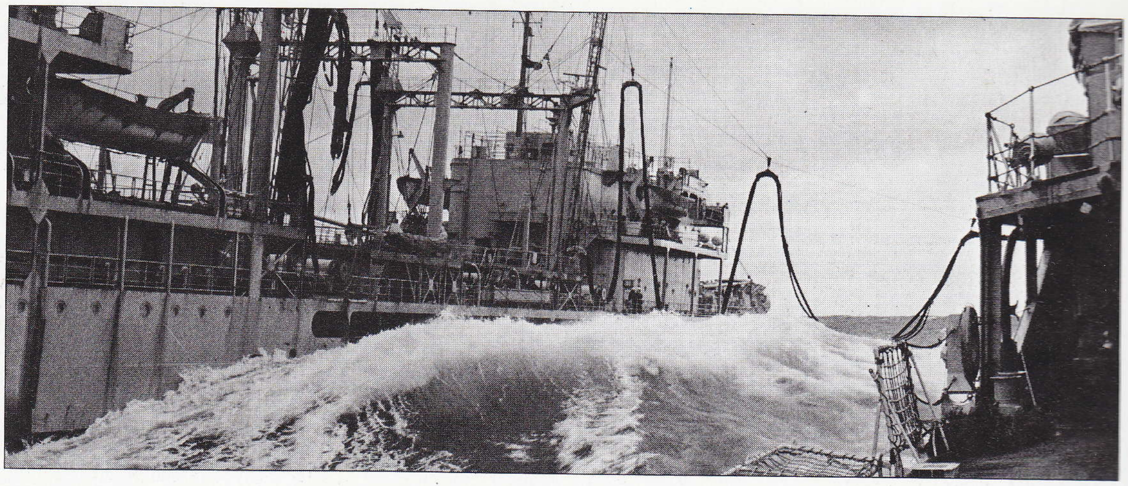
UK

## 'OL' class large fleet tanker

Classified as large fleet tankers or AOF(L), the three **'OL' class** vessels are the ***Olwen*** (A122) commissioned in 1965, the ***Olna*** (A123) commissioned in 1966 and the ***Olmeda*** (A124) commissioned in 1965. All three are fully air conditioned and have specially strengthened hulls to operate in areas with pack ice conditions. They are operated by the Royal Fleet Auxiliary (RFA) with civilian crews for the underway replenishment of the fleet in both the alongside and the astern positions, with the added capability of VERTREP replenishment by helicopter. For this latter they have two hangars (one on each side of the funnel) and a large stern-sited flightdeck. The port-side hangar can accommodate up to two Westland Sea King sized helicopters whilst the starboard side hangar can either accommodate the same helicopter complement or be used as a vehicle garage. The ships provide training billets for naval helicopters as well as homes for detached flights of Sea King or Westland Wessex helicopters used in VERTREP. The cargo capacity is assessed at 20,120 tons of Dieso, 130 tons of lubricating oil, 3,730 tons of AVCAT aircraft fuel, and 280 tons of MOGAS vehicle fuel. During the 1982 Falklands war they were fitted with light AA guns and Corvus chaff rocket launchers. All three now carry satellite navigation and communication systems, and on combat duties restock their fuel cargoes from the RFA 'Leaf' class support tankers or tankers taken up from trade.

**Specification**
**'OL' class**
**Type:** large fleet tanker
**Displacement:** 10,890 tons light and 36,000 tons full load
**Dimensions:** length 197.5 m (648 ft); beam 25.6 m (84 ft); draught 11.1 m (36.5 ft)

**Propulsion:** 1-shaft geared steam turbines delivering 26,500 shp (19761 kW)
**Speed:** 19 kts
**Armament:** see text, but none normally carried
**Aircraft:** between one and four Westland Sea King HAS.Mk 5 or Westland Wessex HU.Mk 5 or Wasp HAS.Mk 1 helicopters
**Electronics:** one Kelvin Hughes 14/12 navigation radar, one Kelvin Hughes 14/16 navigation radar, one SATCOMM system, one SATNAV system, two Corvus chaff launchers
**Complement:** 87 excluding aircrew



**Rough weather increases the turbulence between ships replenishing, seen here as a 'Type 21' class vessel is refuelled from an 'OL' class tanker.**

UK

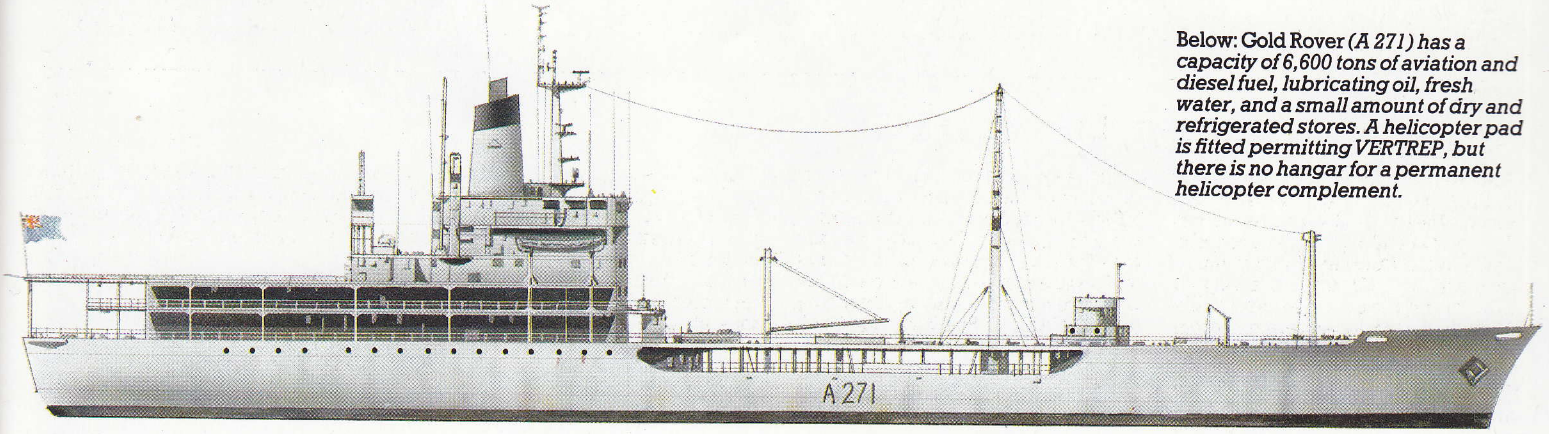
# 'Rover' class small fleet tanker

Designated small fleet tankers or AOF(S), the five 'Rover' class ships were designed to replenish frigate-sized warships on deployment with aviation fuel and Dieso, fresh water, lubricating oil, and limited dry cargo and refrigerated goods under all conditions whilst underway. There is no hangar, although a flight deck (for VERTREP transfer of dry stores and provisions by the helicopter of the ship undergoing replenishment-at-sea) is located aft. The cargo capacity of all the fuel and stores carried is 6,600 tons. Normally one of the class is deployed to Portland on sea training duties in support of the Flag Officer Sea Training (FOST) in his operational training programme of Royal Navy and NATO warships. During the Falklands war only one of the class, the ***Blue Rover*** (A 270), served in the combat zone on replenishment-at-sea duties and supplying fuel and ammunition to the land forces ashore from San Carlos Water. The remaining four units are the ***Green Rover*** (A 268), ***Grey Rover*** (A 269), ***Gold Rover*** (A 271) and ***Black Rover*** (A 273), which bore the brunt of the RFA's operations in support of the Royal Navy and NATO ships nearer home. The ships were commissioned between 1969 and 1974.

## Specification

**'Rover' class**
**Type:** small fleet tanker
**Displacement:** 4,700 tons light and 11,522 tons full load
**Dimensions:** length 140.6 m (461.3 ft); beam 19.2 m (63 ft); draught 7.3 m (24 ft)
**Propulsion:** 1-shaft diesels delivering 15,360 hp (11454 kW)
**Speed:** 19 kts
**Armament:** none
**Aircraft:** provision for one helicopter on a landing pad
**Electronics:** one Decca navigation radar, one SATCOMM system, one SATNAV system
**Complement:** 47

*Seen passing through the Suez Canal,* **Gold Rover** *is one of a class of small fleet tankers designed to deploy with and replenish destroyer- or frigate-sized vessels.*



**Below: Gold Rover** ***(A 271) has a capacity of 6,600 tons of aviation and diesel fuel, lubricating oil, fresh water, and a small amount of dry and refrigerated stores. A helicopter pad is fitted permitting VERTREP, but there is no hangar for a permanent helicopter complement.***

# Fleet Support in the Falklands War

***The South Atlantic campaign of 1982 provided a classic example of the value of an effective fleet support programme. Without the Royal Fleet Auxiliary and the Merchant Navy, the operation to retake the Falklands could not have taken place.***

*A Westland Sea King HAS.Mk 5 has just taken off from the Fort Grange store support ship on a VERTREP mission with an underslung load of ammunition for the army ashore. A large number of Royal Navy helicopters were kept busy just supplying the units ashore while maintaining the flow of stores and provisions to the ships of the Task Force.*

From the fleet support point of view, the Falklands war was a tremendous success. It involved no fewer than 22 of the 27 Royal Fleet Auxiliary vessels available plus the overwhelming contribution from some 50 merchant ships taken up from trade (STUFT) either by requisition or charter. These civilian vessels had to be chosen and then visited by survey parties in all parts of Europe and the Mediterranean, the design modifications required being drawn up and then implemented in either a Royal Navy dockyard or civilian shipyard with a stunning rapidity. Throughout the war these (STUFT) were used not only in support of Royal Navy operations, but in some instances on tasks normally performed by a warship or Royal Fleet Auxiliary (RFA). They served not only as troop transports but also as assault ships, minesweepers, dispatch vessels, fleet and support tankers, aircraft ferries, ammunition and store ships, repair ships, hospital ships. Their sizes ranged from the mighty *Queen Elizabeth 2* and *Canberra* troop ships to the small deep-sea trawlers acting as Extra Deep Armed Team Sweep minecountermeasures vessels.

The fully stocked RFA ships accompanied the Task Force from the outset, replenishing its ships underway at speeds of up to 15 kts with liquid fuels and solid cargoes. The transfer of the latter was accomplished either by specially designed heavy jackstay rigs or VERTREP (vertical replenishment) helicopter lift as an underslung load. The RFA committed to Operation 'Corporate' all five of its purpose-built large fleet tankers, the *Olwen, Olna, Olmeda, Tidespring* and *Tidepool* (which had to be turned back from her delivery voyage to the Chilean navy) together with one of the small fleet tankers, the *Blue Rover*, and the five support tankers *Pearleaf, Plumleaf, Appleleaf, Brambleleaf* and *Bayleaf* (which was prematurely taken from builder's trials). These 'Leaf class vessels are not purpose-built ships, but commercial tankers chartered by the RFA under normal contract arrangements to move bulk fuel loads from oil terminals to MOD storage farms, as well as to replenish the fleet tankers at sea. The solid stores requirements were met by the stores carried in the four fleet replenishment ships *Fort Grange, Fort Austin, Resource* and *Regent* with the aid of the rapidly reactivated stores support ship *Stromness*.

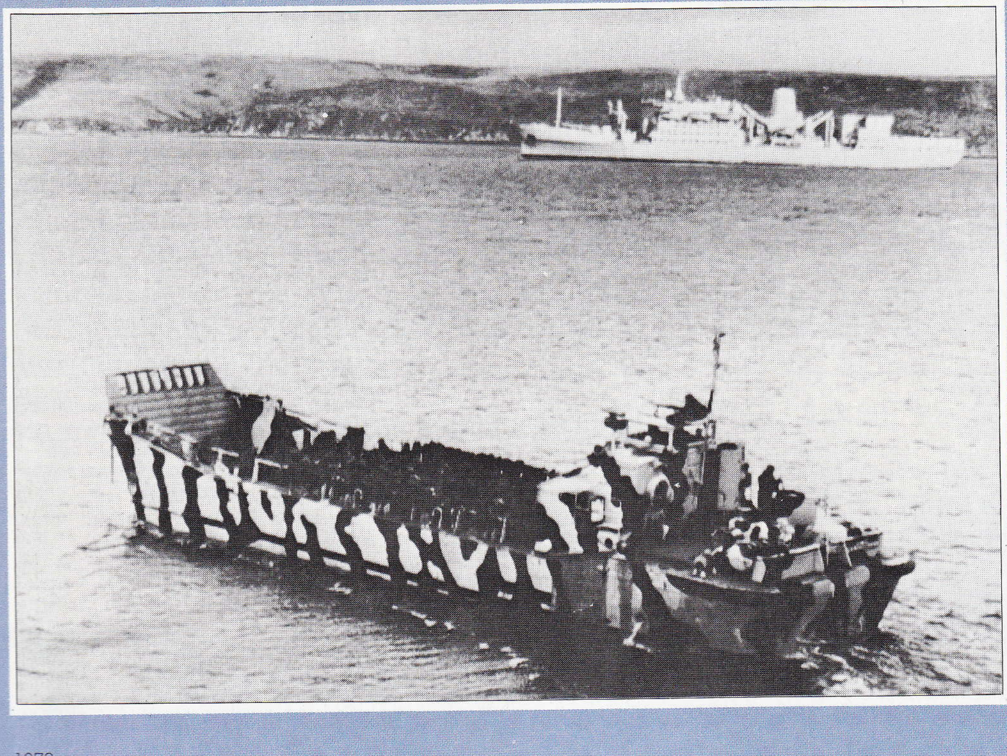
The logistic train for the task force operated with the above RFA ships as the backbone. Those warships which could not be brought up to full war provision levels before sailing were stored on arrival at Ascension Island from a forward logistic base set up there. If specialist spares or urgent items not available on an RFA were required they were sent from the UK by means of the BAe VC10 and Lockheed Hercules air bridge to Ascension and then on to the relevant ship either via a Boeing Vertol Chinook helicopter VERTREP flight or a Hercules paradrop into the sea if the vessel was outside the Chinook's range.

As the RFAs used up their stocks so they too had to be resupplied, and this was the main task of STUFT ships. Fifteen merchant navy tankers were used in four distinct roles as convoy escort oilers (two ships), auxiliary support tankers (10 ships), fuel base storage tankers (two ships) and one vitally important fresh water tanker. The two convoy escort tankers, *British Tamar* and *British Esk*, were equipped with astern refuelling points for warships and special beam fuelling positions for the RFA tankers. The auxiliary support tankers only had a point for refuelling the RFA tankers and conducted a shuttle service between the combat zone and British oil depots in the northern hemisphere. It was during one of these trips south on 29 May that the fully laden support tanker *British Wye* attracted the unwanted attention of an Argentine C-130 Hercules at a point several hundred miles from the Total Exclusion Zone; the C-130 promptly started dropping hand-launched bombs from its rear cargo hold hatch. Luckily four of the seven 227-kg (500-lb) bombs dropped into the sea failed to explode, whilst the three that did explode caused only minor damage to the port side; an eighth bomb actually hit the ship but bounced off the foredeck without exploding. On 8 June a US oil company's Liberian-registered tanker *Hercules* on a passage some 805 km (500 miles) north of the Falklands was also attacked and hit by bombs from an Argentine C-130. Although the bombs again failed to explode, the presence of these unexploded weapons aboard resulted in the *Hercules* having to be scuttled in deep water as it was considered unsafe to try to defuse the bombs.

## Repair and maintenance

Of the remaining chartered vessels, mention must be made of the two multi-purpose diving and offshore oil maintenance vessels *Stena Seaspread* and *Stena Inspector*. It was the former vessel (converted to a repair ship in a 100-hour continuous refit) which acted as a mobile repair base to the task force to patch up battle-damaged ships in the operational zone. This was a much needed capability as there were no friendly naval bases within 8047 km (5,000 miles), and the Royal Navy had in the previous year sent to the scrapyard the only heavy repair ship it possessed. During the war the *Stena Seaspread* dealt with 11 warships or RFAs suffering from battle damage, plus 24 warships, RFAs and merchant ships requiring routine maintenance or repairs, and four captured Argentine vessels. The second repair ship arrived in the Falklands after fitting out in the United States just after the war had ended and the *Stena Seaspread* had sailed for home. She provided a vital repair and maintenance facility for both shore installations and the warships left behind. It is interesting to note that since the war the *Stena Inspector* has been brought into RFA service.

The other major innovation of the war that requires mention was the conversion of the container ships *Atlantic Conveyor, Atlantic Causeway, Contender Bezant* and *Astronomer* to aircraft ferries capable of carrying both helicopters and V/STOL jets. The arrival of the *Atlantic Conveyor* with eight BAe Sea Harriers, six BAe Harrier GR.Mk 3s, six Westland Wessexes, four Chinooks and a Westland Lynx with the task force on 19 May, allowed the two carriers HMS *Invincible* and HMS *Hermes* to replace their combat losses and increase significantly their V/STOL fighter force before the



*During the San Carlos landings in the Falklands the stores support ship RFA Fort Austin was used as an ammunition ship, and provided the ASW support to the amphibious landing force by carrying her maximum load of four Westland Sea King ASW helicopters. Prior to the landings she had been involved in the retaking of South Georgia.*

One of the two 'Tide' class RFA large fleet tankers used in the Task Force support group. Only the Tidespring remains in service now, as the Tidepool has been sold to the Chilean navy. Like the later 'OL' class they can carry up to four helicopters in the two hangars each side of the stack.

vital San Carlos landing. The *Atlantic Conveyor*'s subsequent loss with most of the heavy-lift helicopters still aboard was only partially offset by the arrival of the *Atlantic Causeway* in San Carlos Water on 31 May with 20 Wessexes and eight Westland Sea Kings aboard. The third ship, *Contender Bezant*, arrived to join the battle group on 13/14 June (just as hostilities ceased) with nine helicopters and four more Harrier GR.Mk 3s. The last ship, the *Astronomer*, arrived well after the ceasefire on 26 June with a further 13 helicopters to act as a floating helicopter and repair facility with the Royal Navy's Mobile Aircraft Repair Transport and Salvage Unit aboard.

The war and its aftermath taught the Royal Navy and hopefully the Ministry of Defence many lessons, some new and quite a few others painfully relearned. Above all it showed the planning and resources needed to send and support an amphibious assault force 12875 km (8,000 miles) from home without allies or friendly bases near at hand. What remains to be seen is whether or not the same resources can be mustered again if required in the face of the continuing decline in the British-owned and registered merchant fleet.

*A 'Tide' class large fleet tanker with a Westland Sea King on the aft helicopter pad during VERTREP operations. The cargo capacity of the class is 18,860 tons of fuel oil products such as DIESO, AVCAT or furnace fuel oil for the older vessels of the Task Group such as HMS* Hermes.

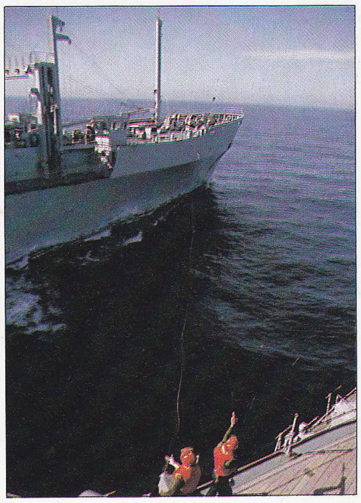
UK

# 'Fort' class fleet replenishment ship

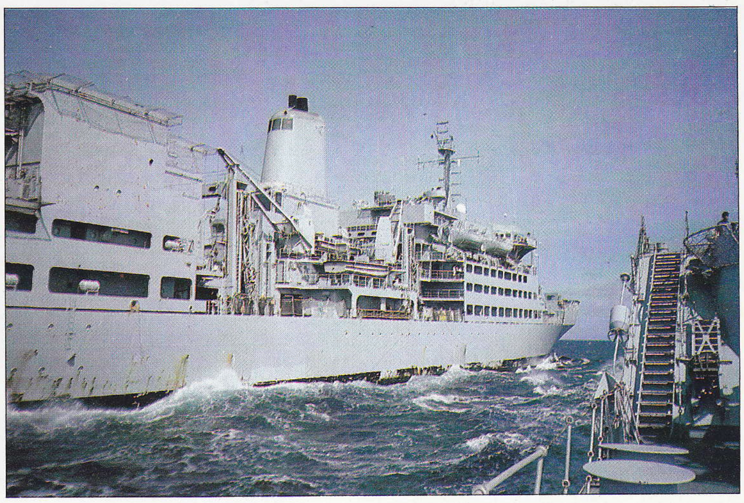
The two **'Fort' class** fleet replenishment ships (AEFS) were ordered in November 1971 from Scott-Lithgow shipyard, Greenock, as the ***Fort Grange*** (A385) and ***Fort Austin*** (A386), and were commissioned in 1978 and 1979. They each have four holds with a volume of 12800 $m^3$ (452,025 cu ft) for 3,500 tons of palletized munitions, provisions (including refrigerated goods) and stores. To handle the cargo the ships each have three 10-ton and three 5-ton capacity cranes, plus sliding-stay constant-tension transfer rigs on each side for use in alongside replenishment operations. For VERTREP operations a large flightdeck and hangar are available. The latter is usually reserved for the ship's own ASW helicopters, as she can act as a floating base for a task group's ASW helicopter force, for which she carries anti-submarine munitions. The hangar can accommodate up to four Westland Sea King helicopters in wartime, though only one is normally embarked in peacetime for VERTREP. The hangar roof may also be used to land helicopters if required.

A new design of RFA is currently under discussion that will combine the AEFS role with the AOF(L) role in a single hull, to give a ship with similar capabilities to the US Navy's fast AOE combat support ship. it would have the ability to service and support a task group's helicopter force in all respects whilst still being able to fly her own ASW unit.

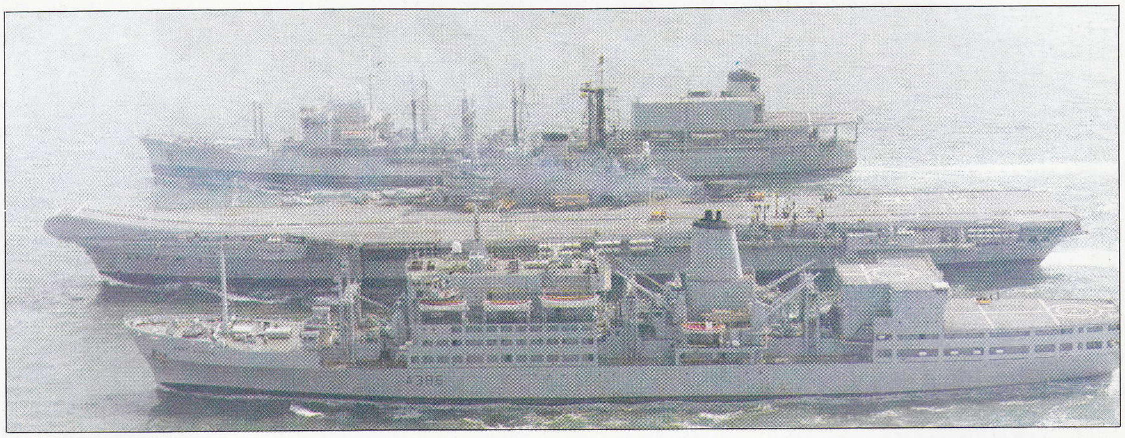
**Specification**
**'Fort' class**
**Type:** fleet replenishment ship
**Displacement:** 8,300 tons standard and 22,749 tons full load
**Dimensions:** length 183.9 m (603.3 ft); beam 24.1 m (79 ft); draught 8.6 m (28.2 ft)
**Propulsion:** 1-shaft diesel delivering 23,200 hp (17300 kW)
**Speed:** 22 kts
**Armament:** two single 20-mm AA guns
**Aircraft:** between one and four Westland Sea King HAS.Mk 5 or Wessex HU.Mk 5 helicopters
**Electronics:** one Kelvin Hughes 21/16P navigation radar, one SATCOMM system, one SATNAV system, two Corvus chaff launchers
**Complement:** 185 plus 36 aircrew



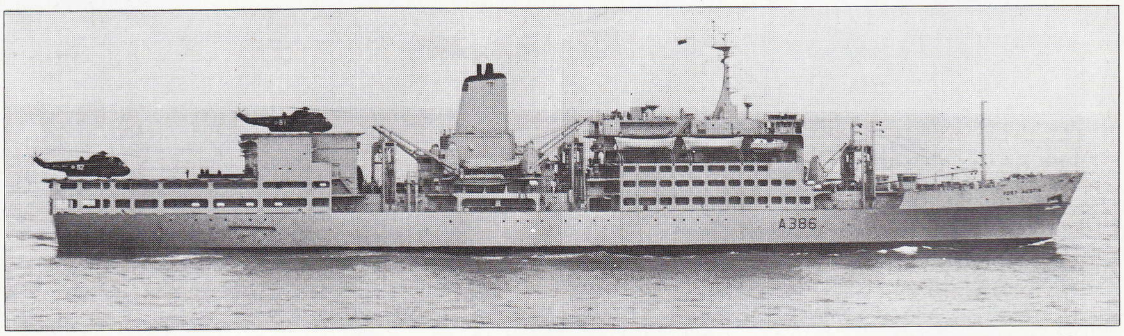
*Above: In order to transfer stores during a RAS a heavy-duty cable has to be passed from one ship to another. This is done by firing a light line across the gap between the ships by rifle, and then hauling the heavier cable across to rig up the constant tension transfer device.*



*Above: One of the 'Fort' class stores support ships closes alongside for an RAS operation. The constant tension transfer rig can clearly be seen with the stores or munitions shipped across in palletized form for greater efficiency in handling.*

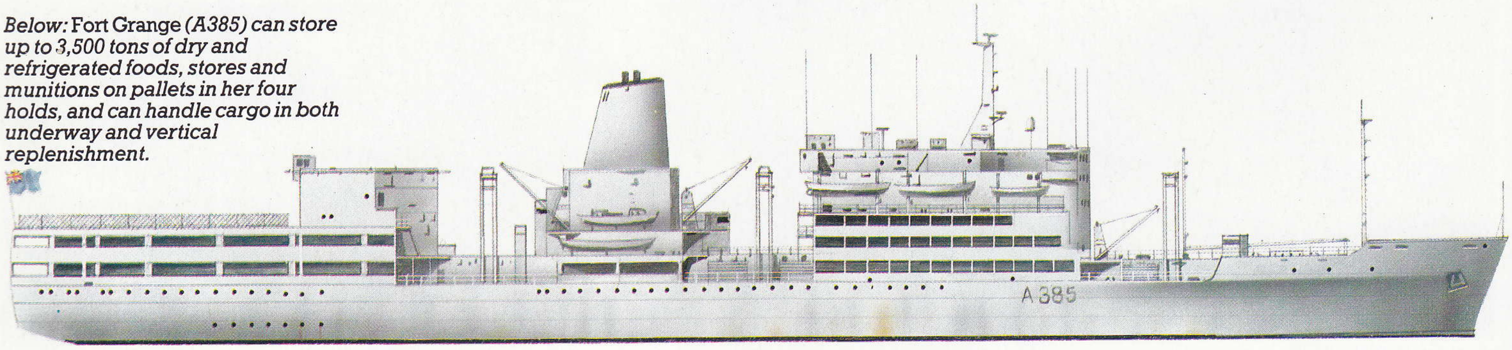


*Below: RFA* Fort Austin *underway with HMS* Hermes *and the large fleet tanker RFA* Olmeda. *A new class of RFA for next decade will combine the roles of both support ships, with a capability similar to the American 'Sacramento' class.*



*Right: Like most replenishment ships today the RFA* Fort Austin *(A386) can carry helicopters. She is seen here with two Westland HAS.Mk 2 Sea Kings occupying the two helicopter landing spots, the foremost of which is atop the main hangar. The helicopters can be used either for VERTREP or ASW duties, for which anti-submarine weapons are carried aboard.*

*Below:* Fort Grange *(A385) can store up to 3,500 tons of dry and refrigerated foods, stores and munitions on pallets in her four holds, and can handle cargo in both underway and vertical replenishment.*



# US Air Force

## Part 9

Responsibility for the training of personnel to man aircraft and undertake ground support functions rests with the Air Training Command (ATC) at Randolph AFB, Texas. One of the largest commands, ATC has a total of 14 major bases in the USA as well as close to 100 training detachments and operating locations in the USA and throughout the rest of the world. Possessing about 1,600 aircraft, it is also one of the major aircraft-operating elements of the USAF and its influence can truly be said to extend to every area in which the US Air Force is active, tuition encompassing all aspects of military education following the absorption of the Air University during 1978.

By far the greater part of flying centres around undergraduate pilot training, the USAF's demand for newly-qualified aircrew being nearly insatiable. Basic flying instruction is handled by the civilian-operated Officer Training School at Hondo Municipal Airport, Texas, potential pilots undergoing a 30-hour course on the Cessna T-41 before progressing to the Cessna T-37 for a further 90 hours of what might best be described as intermediate training. Finally, they move on to the Northrop T-38A Talon for 120 hours of proficiency standard flying, followed by assignment to an operational command for specialist mission training on the type that they will eventually man.

To limit the disruption which might arise from frequent reassignment for different phases of instruction, the six Flying Training Wings (FTWs) which are concerned with undergraduate pilot training operate both of the two major training types of aircraft, the 14th FTW at Columbus, Mississippi; the 47th FTW at Laughlin, Texas; the 64th FTW at Reese, Texas; the 71st FTW at Vance, Oklahoma; the 80th FTW at Sheppard, Texas; and the 82nd FTW at Williams, Arizona. It is also worth noting that training is not limited to pilots for the USAF, several friendly nations sending potential aircrew for instruction in the USA. Most of this tuition is undertaken at Sheppard and Williams, the former unique in that the T-37s and T-38s based there are owned by the West German government although operated in full USAF insignia.

To ensure that sufficient suitably-qualified instructor pilots are available ATC also has one wing engaged solely on the production of instructors; this is the 12th Flying Training Wing at Randolph AFB which, in addition to T-37B and T-38A Flying Training Squadrons, also has an Instrument Flight Center with the Bell TH-1F Iroquois being used to train helicopter instructors.

Training of navigators also falls within ATC's sphere of influence, the 323rd Flying Training Wing at Mather AFB, California, using Cessna T-37Bs and Boeing T-43As for practical lessons on conclusion of initial training in ground-based simulators. No study of ATC would be complete without mention of the Air Force Academy at Colorado Springs. Offering four-year courses for career officers, the Academy has a separate basic flying school with the Cessna T-41 at Colorado Springs, more advanced pilot and navigator training being performed on T-37s and T-43s operating on detachment from Mather.

Specialist trade training is performed by technical training centres located at Chanute, Illinois; Lowry, Colorado; Sheppard, Texas; and Keesler, Mississippi. The last also caters for overseas students. Some of these facilities employ redundant airframes in order to provide practical 'hands-on' experience of aircraft handling and maintenance procedures.

At Maxwell AFB, Alabama, the Air University provides a variety of specialist facilities, serving as home for the Air War College, the Senior NCO Academy, the Air Force Institute of Technology and

***Fledgling USAF pilots receive 90 hours of training on the Cessna T-37 before moving on to the supersonic Northrop T-38 Talon. The T-37 is also used for training navigators and flying instructors, and equips eight flying training wings in all.***

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the Air Command and Staff College amongst others, whilst the increasingly important field of survival training is more than well catered for by the 3636th Combat Crew Training Wing (Survival) with separate elements at Fairchild AFB, Washington; Eielson AFB, Alaska; Homestead AFB, Florida, and Nellis AFB, Nevada, between them able to provide realistic training in temperate forest, jungle, arctic and desert environments.

The activities of AFSC encompass all aspects of US Air Force endeavour, noteworthy additional facilities including the Space and Missile Systems Organization (SAMSO) at Los Angeles Air Force Station with its associated test site at Vandenberg AFB, California; the Armament Division at Eglin AFB, Florida; the Electronic Systems Division at Hanscom AFB, Massachusetts; and the Air Force Contract Management Division at Kirtland AFB, New Mexico. This command also has a fairly sizable fleet of dedicated test aircraft, principal centres of flight activity being located at Edwards AFB, California, Eglin AFB, Florida, and Wright-Patterson AFB, Ohio, which between them operate examples of most combat types to be found in the US Air Force inventory.

## AIR TRAINING COMMAND

### HEADQUARTERS RANDOLPH AFB, Tx

- Technical Training Center, Lowry AFB, Co
- Technical Training Center, Sheppard AFB, Tx
- Technical Training Center, Chanute AFB, Il
- Technical Training Center, Keesler AFB, Ms
- 3480th Technical Training Wing, Goodfellow AFB, Tx (Undergraduate Pilot Training)
- 14th FTW, Columbus AFB, Ms
  - 37 FTS (T-37B)
  - 50 FTS (T-38A)
- 47th FTW, Laughlin AFB, Tx
  - 85 FTS (T-37B)
  - 86 FTS (T-38A)
- 64th FTW, Reese AFB, Tx
  - 35 FTS (T-37B)
  - 54 FTS (T-38A)
- 71st FTW, Vance AFB, Ok
  - 8 FTS (T-37B)
  - 25 FTS (T-38A)
- 80th FTW, Sheppard AFB, Tx
  - 88/89/90 FTS (T-37B, T-38A)
- 82nd FTW, Williams AFB, Az
  - 96 FTS (T-37B)
  - 97 FTS (T-38A)

(Pilot Instructor Training)

- 12th FTW, Randolph AFB, Tx
  - 559 FTS (T-37B)
  - 560 FTS (T-38A)
  - Instrument Flight Center (TH-1F)

(Navigation Training)

- 323rd FTW, Mather AFB, Ca
  - 454 FTS (T-37B)
  - 455 FTS (T-43A)

(Other elements)

- 3636th CCTW (Survival), Eielson AFB, Ak (elements at Nellis AFB, Nv; Fairchild AFB, Wa and Homestead AFB, Fl)
- Air University, Maxwell AFB, Al
- Air Force Academy, Colorado Springs, Co
  - 557 FTS (T-41A)
- USAF Recruiting Service, Randolph AFB, Tx
- Air Force Military Training Center, Lackland AFB, Tx
- Officer Training School (USAF), Lackland AFB, Tx Flying programme at Hondo MAP, Tx (T-41A)
- Foreign Military Affairs Training Group, Randolph AFB, Tx

*A Boeing T-43A of the 455th FTS, based at Mather AFB, California. The T-43 is used for the specialized training of navigators, who also receive some training in the Cessna T-37 before being assigned to an operational command.*

*A Northrop T-38A of Air Training Command. The T-38 is also used in the aggressor role and for weapons training. Trainee pilots receive 120 hours' training on the T-38 before moving on to an operational aircraft type.*

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